



Environmental Assessment of the High Noon Solar Energy Center Project

Application of High Noon Solar Energy LLC for a Certificate of Public Convenience and Necessity to Construct a Solar Electric Generation Facility and Battery Energy Storage Facility in the Towns of Leeds, Lowville, Arlington, and Hampden, Columbia County, Wisconsin

Public Service Commission of Wisconsin Docket 9814-CE-100

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Public Service Commission of Wisconsin

Division of Digital Access, Consumer, and Environmental Affairs

Office of Environmental Analysis

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Acronyms

| § | Section |
|--------------|---|
| A | Amps |
| AC | Alternating current |
| AFUDC | Allowance for Funds Used During Construction |
| APE | Area of Potential Effect |
| ATC | American Transmission Company |
| BESS | Battery Energy Storage System |
| BMP | Best management practices |
| BMS | Battery management system |
| CA | Certificate of Authority |
| CdTe | Cadmium telluride |
| ch. | Chapter |
| Commission | Public Service Commission of Wisconsin |
| Commonwealth | Commonwealth Heritage Group, Inc. |
| CPCN | Certificate of Public Convenience and Necessity |
| CRP | Conservation Reserve Program |
| CTH | County Trunk Highway |
| CUP | Conditional Use Permit |
| DATCP | Department of Agriculture, Trade, and Consumer Protection |
| dB | Decibel |
| DC | Direct current |
| DNR | Department of Natural Resources |
| DPP | Definitive Planning Phase |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| EMF | Electric and magnetic fields |
| EPA | U.S. Environmental Protection Agency |
| ER | Endangered resources |
| ERP | Emergency Response Plan |
| FAA | Federal Aviation Administration |
| FCC | Federal Communications Commission |
| G | Gauss |
| GIS | Geographic Information System |
| GW | Gigawatt |
| JDA | Joint Development Agreement |
| kCMIL | Thousand circular mils |
| kV | Kilovolt |
| LMP | Locational marginal prices |
| LRZ | Load resource zone |
| mG | Milligauss |
| MISO | Midcontinent Independent System Operator, Inc. |
| MOU | Memorandum of Understanding |

| | |
|------------------|--|
| MP | Measurement point |
| MSDS | Materials safety data sheet |
| MW | Megawatt |
| NEC | National Electric Code |
| NESC | National Electrical Safety Code |
| NEV | Neutral-to-earth voltage |
| NFPA | National Fire Protection Association |
| NHI | Natural Heritage Inventory |
| NPV | Net present value |
| NR 40 | Wisconsin Administrative Code ch. NR 40 |
| NRHP | National Register of Historic Places |
| OHWM | Ordinary High Water Mark |
| O&M | Operations and maintenance |
| PPA | Purchase power agreements |
| PSC | Public Service Commission of Wisconsin |
| PV | Photovoltaic |
| PVHI | Photovoltaic Heat Island |
| ROW | Right-of-way |
| SCADA | Supervisory control and data acquisition |
| SHPO | Wisconsin State Historic Preservation Office |
| STH | State Highway |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TCSB | Temporary clear span bridge |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| US EPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USH | U.S. Highway |
| VMS | Vegetation Management Strategy |
| WEPA | Wisconsin Environmental Policy Act |
| WHPD | Wisconsin Historic Preservation Database |
| WHS | Wisconsin Historical Society |
| Wis. Admin. Code | Wisconsin Administrative Code |
| Wis. Stat. | Wisconsin Statutes |
| WisDOT | Wisconsin Department of Transportation |
| WPA | Waterfowl Production Area |
| WPDES | Wisconsin Pollutant Discharge Elimination System |
| WRP | Wetland Reserve Program |

1. Introduction

On July 6, 2022, High Noon Solar Energy Center LLC (High Noon or applicant), an affiliate of Invenenergy LLC, filed an application with the of Public Service Commission of Wisconsin (Commission) to receive a Certificate of Public Convenience and Necessity (CPCN) for the authority to construct a solar electric generation facility (docket 9814-CE-100). The solar facility would have a nameplate capacity of 300 megawatts (MW) alternating current (AC). The applicant also includes in the CPCN application a request for authority to construct a 165 MW battery energy storage system (BESS) and 1.9-mile, 345 kilovolt (kV) generator transmission tie line (gen-tie line). Pursuant to Wis. Stat. §196.491(3)(a)1, a separate CPCN for the generator tie-line is not required, and authorization can be requested and granted as part of the generation facility CPCN.

The applicant's request to receive a CPCN was filed with the Commission pursuant to Wis. Stat § 196.491 and Wis. Admin. Code § PSC 111. The Commission determined the project application to be complete on August 5, 2022. The applicant sent copies of the complete applications to the clerk of each municipality in which the project might be located and to the libraries in the project region.

The High Noon solar generation facility (also referred to as 'the proposed project') would be a 300 MWAC solar photovoltaic (PV) electric generation site. The proposed project would be made up of separately fenced arrays, and the applicant provided both proposed and alternative arrays. The proposed arrays would use approximately 1,928 acres, and the alternative arrays would use approximately 847 acres. The applicant states that approximately 2,057 acres are necessary to host the proposed project (solar arrays, substation, BESS, etc.). High Noon would develop, construct, and operate the generation facility as a wholesale merchant plant, and at the time of the application, no Wisconsin public utilities are under contract for delivery of energy or purchase of the project.

1.1. Analysis for Wisconsin Environmental Policy Act Compliance

Construction of solar electric generation facilities are Type III actions under Wis. Admin. Code § PSC 4.10(3). Type III actions normally do not require preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). However, an evaluation of a specific Type III proposal may indicate that the preparation of an EA is warranted for that proposal. In addition to the solar facilities, the applicant is also requesting authorization to construct a battery energy storage system. The construction of an electric energy storage facility is a Type II action under Wis. Admin. Code § PSC 4.10(2). Type II projects require the preparation of an EA to determine if an EIS is necessary. The Commission is preparing this EA to consider the environmental and community impacts of the project. When the EA is complete a preliminary determination is made on whether to undertake a full EIS and comments on that determination are considered before a final determination is made. At the time of the preliminary determination, the Commission provides copies of the EA to those persons that request it.

An EIS is required if an EA determines there are significant impacts to the environment as a result of the project. The EA is a written review of the potential impacts of the proposed project that would affect the quality of the human environment as described in Wis. Stat. § 1.11(2)(c). The EA also describes ways of mitigating or avoiding some of the expected impacts and concludes with the evaluation of ten items described in Wis. Admin. Code § PSC 4.10(2)(d).

In accordance with Wis. Admin. Code § PSC 4.20(1m), notification¹ of the Commission's intent to prepare an EA, including a solicitation for comments on the environmental aspects of this proposed project, was sent to the mailing list for this docket on August 12, 2022. The mailing list includes:

- Local residents and landowners potentially affected by the project
- Municipal officials in the towns and counties covered by the project area
- Local news media
- Libraries in the project area
- Legislators representing the affected area
- Any other persons with a demonstrated interest in the proposed project

Through the EA scoping period, Commission staff solicit public comments about the proposed project, and take any comments of concerns regarding the environmental assessment or review of the project into consideration during the analysis of the project. The comments received are discussed in a further section of this EA.

1.2. Environmental Assessment Scope

Wisconsin Admin. Code § PSC 4.20(1) states that an EA shall be a concise document that provides a factual investigation of the relevant areas of environmental concern in sufficient depth to permit a reasonably informed preliminary judgement of the environmental consequences of the proposed project. The EA includes a recommendation on whether the proposed project is a major action significantly affecting the quality of the human environment, within the meaning of Wis. Stat § 1.11(2)(c). An EIS is required if an EA determines there are significant impacts to the environment as a result of the project.

The scope of the EA is to review and describe the reasonably anticipated or potential impacts the construction and operation of the proposed project would have on the environment. Impacts to local residents, communities, and other parts of the human environment are reviewed, as well as impacts to natural resources. The EA describes potential impacts and, if applicable, potential mitigation actions that could occur to reduce or avoid those impacts. The scope of the EA is generally limited to the project as described, although it does discuss some of the cumulative impacts from additional similar projects or new projects that would be necessary if the proposed project is authorized. The analysis in the EA is provided to the public, intervenors, and the Commissioners to inform comments and decisions regarding the proposed project.

¹ PSC REF#: 445188 - EA Scoping Letter

1.3. Information Received During EA Process

Wisconsin Admin. Code § PSC 4.20(2)(f) states that the EA shall include a list of other persons contacted and a summary of comments.

Contributors to EA

No other persons besides staff at DNR and the Commission were contacted or involved in the preparation of this EA. The following DNR and Commission staff contributed to the EA:

- Stacy Schumacher, PSC Environmental Analysis and Review Specialist, Division of Digital Access, Consumer and Environmental Affairs
- Tyler Tomaszewski, PSC Environmental Analysis and Review Specialist, Division of Digital Access, Consumer and Environmental Affairs
- Cheng Wu, PSC Engineer, Division of Energy Regulation and Analysis
- Geri Radermacher, Wisconsin DNR, Energy Project Liaison, Bureau of Environmental Analysis and Sustainability
- Stacy Rowe, Wisconsin DNR, Conservation Biologist, Bureau of Environmental Analysis and Sustainability

Summary of Public Comments

The Commission received 126 public comments during the EA scoping period. Commission and DNR staff considered all the comments that were received during the EA scoping period in their preparation of the EA. Comments were received from both participating and non-participating landowners in the project area, as well as interested people not in the project area. The most common topics addressed in public comments were impacts to agriculture, the impact of the project to address climate change, the local revenue produced through the shared revenue program, and impacts to wildlife movement. Comments about agriculture varied, some expressed thoughts that the land would rest, inputs of chemicals would decrease, and runoff and soil erosion would decrease, but others thought that remaining agricultural producers may experience higher rents, belief that the land should continue to produce food crops, and skepticism that land would return to agricultural use in the future. Most of the topics raised in the scoping comments are discussed in the EA.

1.4 CPCN Hearing and Intervenor

The Commission issued a Notice of Proceeding for the docket on September 15, 2022, indicating that a hearing would eventually be held on the proposed project. On October 11, 2022, the Commission's Administrative Law Judge (ALJ) granted unopposed requests for intervention to the following entity:

- RENEW Wisconsin

The Commission's ALJ issued a scheduling order for the docket without a Prehearing Conference, as the parties agreed in advance on topics such as intervention, issues, schedules, and other matters that would facilitate the hearing process. The Commission will issue a Notice of Hearing that describes how the public can participate in the public hearings on the project. The public hearings are scheduled for March 1, 2023, at 2:00 p.m. and 6:00 p.m. The technical hearing for parties to the proceeding is scheduled to be held on March 1, 2023, at 10:00 a.m. Due to the COVID-19 pandemic, recent hearings have been held over an internet web meeting platform, with the ability for the public to join via the platform or by telephone. The ALJ will decide whether the hearings will be held in total or in part via an internet web meeting platform, or whether they would return to in-person hearings.

2. Project Description

In accordance with Wis. Admin. Code § PSC 4.20(2)(b), the EA includes a description of the design of the facilities to be constructed, the construction process, and the project areas. Additionally, Wisc. Admin. Code § PSC 4.20(2)(a) directs the EA to describe the purpose and need for the proposed projects.

2.1. Purpose and Need

The purpose of the proposed project is to generate utility-scale solar electricity. As High Noon is a developer of a wholesale merchant plant, it is exempt from the needs analysis that would be required of a state public utility seeking a CPCN. The Commission's review of CPCN applications for wholesale merchant plants is more limited than for projects proposed by public or investor-owned utilities. Under Wis. Stat. § 196.491(3)(d)2, a wholesale merchant plant CPCN application need not demonstrate that its facility would meet the reasonable needs of the public for electricity. The Energy Priorities Law ranks energy conservation and efficiency as its highest priority, with noncombustible renewable resources as the second highest priority.

2.2. Cost and Ownership

High Noon is a wholly owned subsidiary of Invenergy Solar Development North America LLC and an affiliate of Invenergy LLC, developing the project as a wholesale merchant plant. The applicant did not provide an estimated total cost for the new solar generation facility because that requirement is only applicable to public utility projects seeking authorization under a CPCN or Certificate of Authority (CA). The Commission's review of CPCN applications for wholesale merchant plants is more limited than for projects proposed by public or investor-owned utilities. Under Wis. Stat. § 196.491(3)(d)3, the Commission may not consider economic factors when evaluating the application of a wholesale merchant plant for a CPCN.

At the time of the application, High Noon has not identified a public utility that is planning to acquire, own, and operate the proposed project. If a public utility seeks to purchase the project in the future, the purpose and need, as well as economic analysis, would occur in a buy/sell docket.

2.3. Location

The proposed project is located in southern Columbia County, Wisconsin. The project would be constructed across multiple municipalities, including the Towns of Arlington, Hampden, Leeds, and Lowville. Most of the proposed arrays would be in the Towns of Leeds and Lowville. Some small areas of alternative arrays are in all the towns listed above, with most of the alternative arrays in the Towns of Hampden and Leeds. The collector substation, O&M building, and BESS would be in the Town of Leeds. The gen-tie line would run from the collector substation in the Town of Leeds to a new Interconnection Switchyard in the Town of Arlington. Figure 1 on the following page shows a map of the proposed project with the wider project area. Figure 2 shows the proposed project over aerial imagery to give a context of the landscape in the project area.

The project area is north of State Highway (STH) 60, northeast of U.S. Highway (USH) 51, south of Mud Lake, and apart from alternative arrays W and X, west of county highway (CTH C). Most of the project area is agricultural fields, with some open grassland and marshland, usually associated with public conservation lands, and relatively small and isolated forested areas. Residences are fairly scattered through the project area, with the nearest residential concentrations located in the unincorporated community of North Leeds, south of the project area, and the Village of Arlington, to the southwest of the project area.

Figure 1 Map of the Project Area

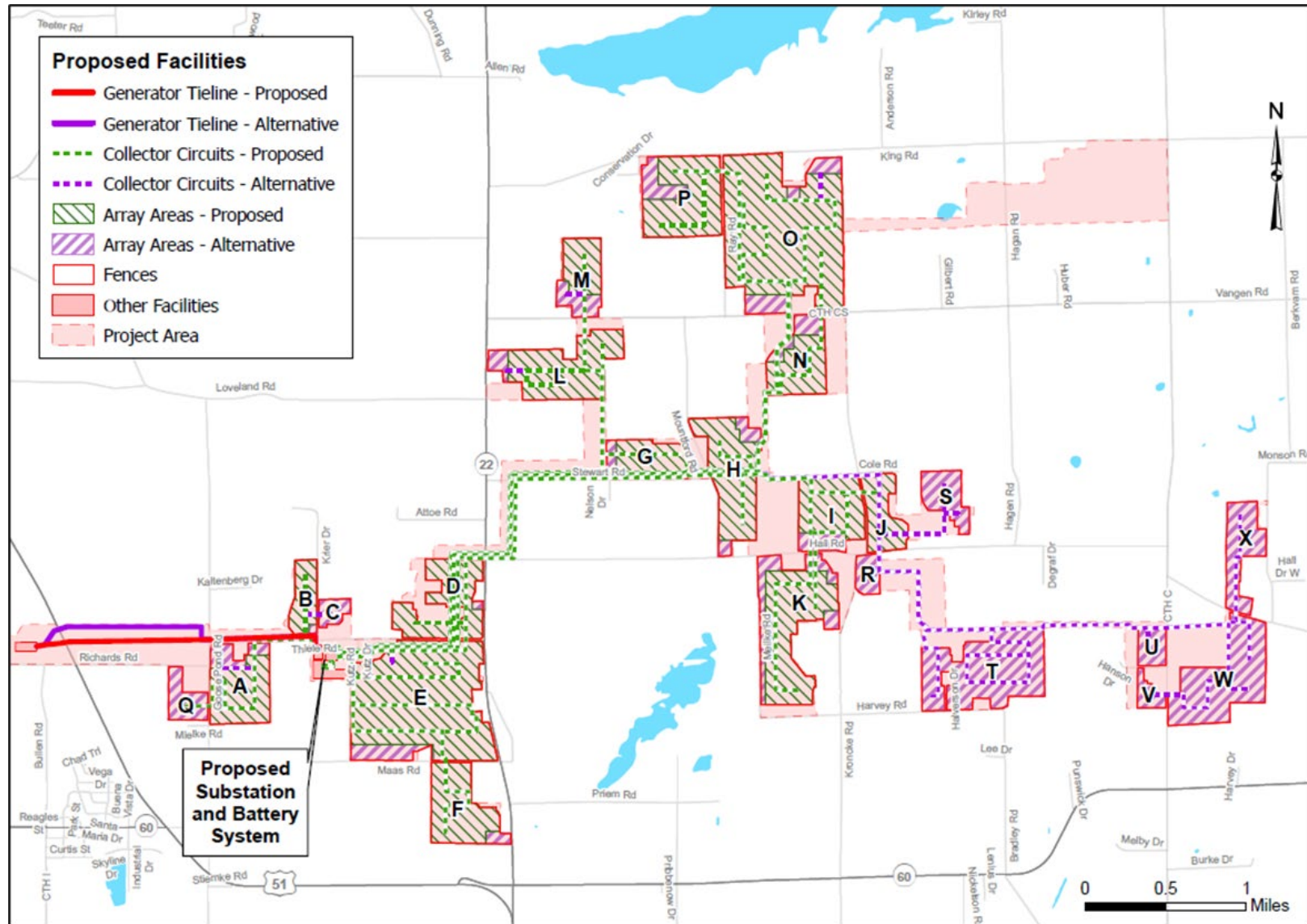
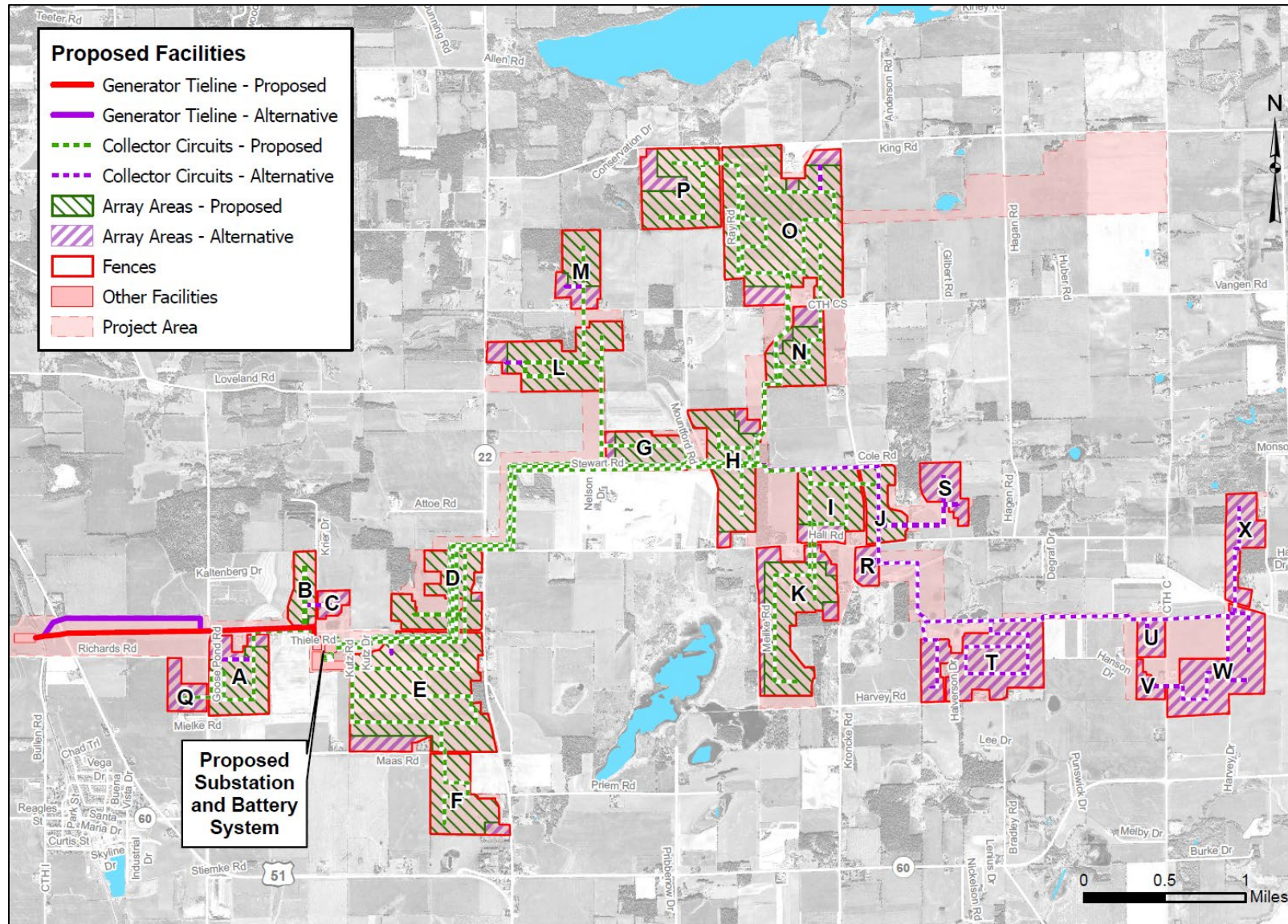


Figure 2 Map of the Project Area with Aerial Imagery



2.3.1. Applicant's Siting Process

The applicant described how it used a multi-tier process to evaluate siting options for the proposed project; state-level, regional level, and project area level, and how the eventual location was selected. At a state level, the applicant considered solar resource data such as irradiance and weather patterns, determining that southern Wisconsin was favorable for the type of solar project proposed.

At a regional level, applicants evaluate criteria relating to the availability of land and the suitability of the existing transmission grid. Applicants consider the topography (minimal slopes are preferred), current land cover (avoiding sensitive habitats), and current land use in the area. The location and condition of the transmission grid is evaluated to determine where a suitable interconnection could be located. Developers evaluate different points of interconnection to the existing transmission system and look for locations that have existing transmission capacity with existing infrastructure or cost-effective upgrades. A preliminary evaluation of environmental factors such as parks, public land, wetlands, waterbodies, and habitats is done, to ensure that there would be large enough areas for project facilities. Applicants also do preliminary evaluations of the local community and landowner support and acceptance of a project.

At a local siting level, siting of specific facilities such as arrays are refined by considering engineering requirements, examining land information, conducting site visits, discussions with participating landowners, and conducting community meetings to solicit public input. High Noon stated that the following specific criteria were evaluated to determine the project layout submitted in the application:

- Land use and zoning, including setbacks in local ordinances
- Land rights
- Topography, Geology, and Soils
- Existing vegetative communities
- Threatened and endangered species
- Cultural resources
- Water resources including surface water, wetlands, and floodplains
- Noise and glare potential
- Aviation
- Existing infrastructure
- Efficiency of construction and conformity to uniform arrays
- Public outreach and feedback from neighbors.

In general, solar PV generation sites benefit from areas with flat topography and minimal grading requirements. Avoiding areas that would cast shade onto the PV panels is another suitability factor. Large agricultural fields that are not surrounded by forests or tall buildings are often considered preferred sites. Siting reviews also attempt to avoid impacts to natural resources such as wetlands, waterways, rare species, and historic resources to the greatest extent possible. As a developer of a wholesale merchant plant, High Noon would not have the ability to

use eminent domain to acquire property for the construction of the generation site or associated facilities, so there needs to be local support for the project from landowners in order to obtain parcels that allow for the construction of arrays in efficient layouts.

As the High Noon project is a merchant plant, the Commission may not consider economic factors when evaluating its proposal. A meaningful comparison of alternative project locations is not possible without the ability to consider costs and economic factors. As a result, discussion of alternative project sites in this EA, other than the larger project siting process described in this section, focuses primarily on how the Commission may choose among the range of array sites within the High Noon project footprint.

2.3.2. Brownfields

Under Wis. Stat. § 196.491(3)(d)8, the Commission must consider whether brownfields are used to the extent practicable when evaluating large electric generation facilities. Brownfields, as defined by Wis. Stat. ch. 238.13(1)(a) are defined as abandoned, idle, or underused industrial or commercial facilities or sites, the expansion or redevelopment of which is adversely affected by actual or perceived environmental contamination.

In developing the application, High Noon reviewed data on brownfields held by the U.S. Environmental Protection Agency (EPA) for southern Wisconsin, including Dane, Columbia, Dodge, Green, Jefferson, Rock, Sauk, and Iowa Counties. High Noon did not find a site that could host the project facilities for a 300 MW solar energy project based on acreage needed or other criteria in its siting process. High Noon stated that it used EPA rather than DNR information as the DNR list of sites in the Wisconsin Remediation and Redevelopment Database is a list of contaminated sites and may not be limited to those sites considered “brownfields”.

Commission staff reviewed information held by EPA and DNR on brownfields and contaminated sites. Commission staff accessed the EPA’s “RE-powering Mapper”, an interactive web application that allows users to identify contaminated lands, landfills, and mine sites for the same counties the applicant reviewed. The site with the largest amount of acreage listed is the University of Wisconsin-Arlington Agricultural Research Station, listed as there have been spills resulting in contaminated soils over the life of the facility. However, that location is still in active use and would not meet the definition of a brownfield. The largest landfill site in the EPA RE-powering data for the selected counties is the Sauk County Landfill, however, at 320 acres, it would not be large enough to host the proposed project, even if it was found to be feasible for construction.

2.3.3. Minor Siting Adjustments

It is the applicant's obligation to minimize the need for minor siting adjustments by rigorously analyzing its proposed project. The Commission recognizes that detailed engineering is not complete prior to authorization of a project and that minor siting adjustments may be needed to accommodate the final design of the project. Situations may be discovered in the field that were not apparent based on the information available to the applicant in development of the proposed

project or to the Commission in making its authorization. Therefore, the Commission typically includes an order condition that allows for minor siting adjustments when authorizing a project.

The minor siting adjustment order condition requires that the applicant consult with Commission staff when proposing a change in siting. If the review determines that the proposed change requires Commission approval, the applicant must request authorization in the form of a letter containing details on the following items:

- The nature of the requested change
- The reason for the requested change
- Incremental differences in any environmental impacts
- Communications with potentially affected landowners regarding the change
- Documentation of discussions with other agencies regarding the change
- Maps of the approved layout and the proposed change, including property boundaries and natural features

Minor siting adjustment requests are reviewed by Commission staff. Approval is delegated to the Administrator of the Division of Energy Regulation and Analysis with the advice and consent of the Administrator of the Division of Digital Access, Consumer, and Environmental Affairs.

Proposed changes require reopening of the docket unless the following criteria are met:

- No new resources are affected that were not discussed in the EA.
- No new landowners are affected who have not been given notice and hearing opportunity or who were given proper notice and hearing opportunity in a significantly different manner than was originally approved.
- The changes would not affect a unique occurrence not discussed in the EA of, for example, a human burial, archaeological site, or protected species.

Additional requirements for the applicant following an approved change include:

- Obtaining all necessary permits.
- Complying with agreements made with local units of government.
- Complying with all landowner agreements.
- Avoiding parts of the project area that the Commission finds unacceptable.
- Complying with the applicant's environmental siting criteria.

2.4. Schedule

Before construction on the proposed project could proceed, a CPCN is needed from the Commission. According to Wis. Stat. §196.491(3)(g), the Commission must make a decision on whether to approve or deny a CPCN application within 360 days of the application being found complete. Additional permits and approvals may be necessary before construction can proceed in whole or in part, as discussed in the application and in Section 2.5 of the EA below. The applicant provided an estimated project construction schedule in the application.

If the Commission approves the CPCN application, the applicant would conduct final engineering and site design or refinement. The applicant would commence construction of the project in May 2024 or earlier. Construction would start with site preparation, including grading and road installation, anticipated for May and June of 2024. Solar pile installation and racking installation would begin in July 2024 and continue through April 2025. The applicant anticipates that solar modules would be delivered to the site beginning in October 2024. Modules may be installed that autumn and into winter as weather allows. Construction activities may slow substantially, or even stop, during some winter months. Generally, construction of the solar facility would be completed by July 2025. The collector substation and BESS would be constructed starting in summer of 2024 and continue through spring of 2025. The gen-tie line would be constructed from November 2024 through January 2025.

Solar projects are constructed in phased or rolling sections across the multiple power blocks that make up large sites. The applicant states that it would take approximately 12 to 16 weeks for one power block to be constructed if it was done in isolation. Once the project facilities are constructed, there would be commissioning and testing of components before they are placed in service and operation. The applicant anticipates the project would go into commercial operation by December 2025.

2.5. Permits and Approvals

High Noon submitted an application to the Commission for a CPCN, as required by Wis. Stat. § 196.491, for proposed electric generation facilities of 100 MW or more. The Commission will decide whether to approve, deny or modify the project.

The Commission must make a number of determinations regarding construction projects in a short timeframe, without knowing whether other regulatory permits will be issued. The Commission typically includes language in an order authorizing a project that states an applicant is required to obtain all necessary federal, state, and local permits prior to starting construction as a practical way of mitigating that uncertainty. The reason for this requirement is to ensure the Commission does not approve, and the applicant does not begin work on, a project that would not be able to obtain permits from other regulatory agencies, or begin construction in an area without following possible mitigation or construction requirements that are required by another regulatory agency permit. Table 1.8.1 of the application provides information on potential regulatory permits and requirements, with a regulatory point of contact, description of what triggers the permit, potential filing date and status. The following table lists some of the permits, approvals, and standards that are potentially necessary for the proposed project:

Table 1 Regulatory Requirements

| Approval/Requirement | Agency | Process |
|---|---|---|
| Certificate of Public Convenience and Necessity | Public Service Commission | Engineering Plan submitted 9/30/2021. Application submitted 7/06/2022. |
| Federal Threatened and Endangered Species Review and Bald and Golden Eagle Protection Act | United States Fish and Wildlife Service | Information for Planning and Consultation - Completed and is included in Appendix A of the application. |
| Wisconsin Pollutant Discharge Elimination System (WPDES) Construction Site Storm Water Runoff General Permit (NR 216) | Wisconsin DNR Office of Energy | Storm Water Management and Erosion Control Plan, and Water Resources Application for Project Permit are needed for projects with disturbance over one acre. |
| Waterway Permitting, Wis. Stat. ch. 30 | Wisconsin DNR Office of Energy | Pond/Artificial Waterbody within 500 feet of a navigable waterway require DNR permitting. |
| Waterway and Wetland Impact General Permit | Wisconsin DNR Office of Energy | Applicant does not anticipate needing coverage as no impacts are expected, will apply for if needed. |
| Private Well Notification Number, Well Location Permit | Wisconsin DNR, Bureau of Drinking and Groundwater | Required if a new well is constructed for the O&M building. |
| State Threatened and Endangered Species Review | Wisconsin DNR | Review of Natural Heritage Inventory database and project area. Identification of any species or habitat records and actions to avoid impacts. |
| Cultural and Archaeological Resources Review under Wis. Stat. § 44.40 | Wisconsin Historical Society (WHS) | Cultural report submitted to Commission. The Commission is determining compliance with WHS. |
| Utility Use of ROW Permit (DT 1553) | Wisconsin Department of Transportation (WisDOT) | Utility crossing permits to construct or maintain utility facility in road corridor. |
| Driveway Permit (DT 1504) | WisDOT | Permit required for new driveway entrances on state highways/roads. |

| Approval/Requirement | Agency | Process |
|--|--|--|
| Oversize/Overweight Permit | WisDOT | Permit required for transportation of oversize/overweight loads. |
| Storm water and Erosion Control Permit | Columbia County | Required for activities that cause land disturbance over a certain size. |
| Driveway access permit | Columbia County Highway Department | Required for new driveway access onto county highway/ROW. |
| Permit to conduct work in County Highway ROW | Columbia County Highway Department | Required for installation of utilities in county ROW. |
| Oversize/Overweight Permit | Columbia County Highway Department | Permit required for transportation of oversize/overweight loads. |
| Sanitary Permit/Private Onsite Wastewater Treatment System (POWTS) Plan Review | Columbia County Health Department and WI DSPS. | Review and Permit required if an on-site septic system is installed at the O&M facility. |
| Building Permit | Town of Leeds | Required for construction of the O&M building. |
| Driveway Permit | Towns of Arlington, Hampden, Leeds, and Lowville | Required for construction of a new access point/driveway on town roads. |

County and local governments have numerous responsibilities that can be addressed during the Commission's CPCN project review. Local Planning and Zoning land use permits would not be required because the project is going through the state CPCN process. The applicant states that it would offer to negotiate Joint Development Agreements (JDA)² with the local jurisdictions that would discuss items such as road impacts (maintenance and repair, haul routes, driveway permits), reimbursement of costs, decommissioning, public safety and emergency services, and a dispute resolute process, among other topics. The applicant has discussed the project with local municipalities, including Columbia County and the local towns, but has not completed any agreement at the time of the application. Potential effects on a local government jurisdiction would be considered by the Commission as an impact on the existing local social environment.

² A template of the JDA language used by the applicant in its negotiations with local jurisdictions is provided as Appendix W of the application (see PSC REF#: 442078).

2.6. Construction Process

The construction process for a utility-scale solar electric generation facility can generally be expected to follow the following steps:

Site preparation

- Project staff complete final designs and are deployed to the project work areas.
- Sensitive resources and site boundaries are mapped and marked on site plans and in the field (with signs or flagging) as needed.
- Construction entrances and exits are stabilized with tracking pads and aggregate material, and storm water and erosion control best management practices (BMPs) are installed in accordance with the final site plans.
- Staging and laydown areas are developed and aggregate materials placed to create a stable area for the delivery of materials and equipment. Construction trailers are placed at the main laydown area.
- Vegetation is removed where necessary to complete work, and/or open fields may be seeded to stabilize soils, particularly where limited or no ground disturbance is expected, or would occur later in time.

Construction Process

- Access roads are constructed if used, with topsoil typically stripped and spread onsite, or potentially stockpiled and stabilized, before a layer of aggregate material is placed.
- Site grading occurs in accordance with the final designs. Erosion and storm water control BMPs should be regularly checked to ensure they are in compliance with DNR technical standards.
- Delivery of machinery and equipment is done on a consistent basis as construction occurs across the project.
- Array perimeter fences and gates are installed, usually as driven posts, though on occasion concrete may be needed for supports.
- Concrete foundations and aggregate materials are installed at the substation and BESS sites as applicable.
- Piles for the solar arrays are placed, moving from area to area as machinery, materials, and site conditions allow. If pile refusal occurs in an area, holes may be pre-drilled.
- The collection system is installed through trenching, vibratory plows, and directional drilling as appropriate for conditions.
- Inverters and racking systems for arrays are installed across the site.
- Site restoration is conducted in areas where ground disturbance is complete, including fine grading of surface soils, seeding the area, and removing waste materials.
- The solar PV modules are installed.
- Substation equipment is installed.
- A gen-tie line is constructed (as applicable) and the solar project is connected to the transmission system.

Project Finalization

- Conduct electrical testing and inspect solar equipment prior to energization.
- Conduct interconnection inspections and testing.
- Remove any temporary roads, laydown yards, and staging areas. Remove any aggregate materials, decompact underlying subsoils, replace and decompact stored topsoils.
- Conduct final permanent seeding or supplemental seeding on site in accordance with site-specific vegetation management plans.
- Continue monitoring and maintaining erosion control and storm water BMPs until 70 percent vegetation establishment exists, allowing the NR 216 permit to be closed.
- Conduct any follow up studies or work required by Commission Final Decisions as applicable.

The construction of any solar facility may have some minor variations in construction process based on the developer, the contractor selected, and site-specific conditions.

2.7. Technical Description and Design

High Noon Solar Energy LLC, as an independent power producer, a wholly owned subsidiary of Invenergy Solar Development North American LLC, and an affiliate of Invenergy LLC (collectively, Invenergy), is the site developer. The applicant provided preliminary information on the technical aspects of the proposed project, including examples of the solar modules, inverters, and BESS components being considered in its design. The applicant also provided a layout showing “proposed” and “alternative” array sites that would make up the area needed to host the 300 MW solar project and 165 MW BESS. Certain details have not been decided at the time of the application, such as the specific solar PV module or inverter. Other details may be determined or refined based on a Commission decision, such as the specific array layouts. The following sections of the EA describe some of the anticipated characteristics of the proposed project facilities based on information provided in the application.

2.7.1 Project Components

Solar PV electric generation facilities are comprised of several major component types, which can include:

- Solar PV panels, the supports/racking, and a tracker system.
- Inverters
- Collector circuits
- Project substation
- Generator Transmission Tie Line (Gen-Tie)
- Battery Energy Storage System (BESS)

The details required for the solar generation facility and BESS to be operational have been reviewed in MISO transmission studies between the applicant, MISO, and ATC as part of the MISO Definitive Planning Phase (DPP) 2019 Study Cycle and MISO DPP 2021 Study Cycle.

The applicant's 2019 interconnection positions are a 300 MW Solar position and a 75 MW BESS position while the applicant's 2021 interconnection position is a 90 MW BESS position. Approximately 2,904 acres would make up the potentially impacted areas designated as the proposed solar arrays (1,928 acres including fenced areas and facilities within), Commission-required alternative solar arrays (847 acres including fenced areas and facilities within), and auxiliary facilities such as the BESS, project substation, O&M Building, interconnection switchyard, and gen-tie line (129 acres including fenced areas and facilities within). The land needed is under contracts that are to be executed between landowners and High Noon.

Solar Panels and Trackers

Solar panels take light coming from the sun and convert it into electrical energy, which can then be used to provide electricity to homes and businesses. Solar panels produce the electricity as direct current (DC) power, which must then be converted to AC power before it can be sent to the electric grid and used for residential and commercial purposes. The electric power produced by the project is rated in AC power and interconnected to the grid based on the AC rating of the site. Solar panels come in several different types, including thin film, polycrystalline silicon, and monocrystalline silicon. Some panels feature improved efficiencies by using features such as bifacial glass, which can absorb sunlight directly from the sun, as well as reflected off the ground on the underside of the panel.

The applicant provided information on some of the solar panels being considered for the proposed project in Appendix B of the application³. Most panels being considered are bifacial monocrystalline silicon and all would be treated with an anti-reflective coating to minimize glare. Panel electric capacities would range from 450 to 600 watts DC per module, resulting in an approximate range of 645,000 to 860,000 PV panels to ultimately produce up to 387 MWDC (300 MWAC). The rectangular panels presented vary from approximately 3.4 to 4.3 feet in the shorter dimension and 6.8 to 7.8 feet in the longer dimension. The total surface area that would be made up of solar panels would be approximately 500 acres for the proposed array layout.

All PV panels would be grouped and organized into power blocks. A power block would involve multiple solar panels strung together, with multiple strings associated with one tracker. The panels in each power block would be connected to inverters to convert the DC power produced by the solar panels into AC.

Solar panels can either have a fixed orientation or have one or more axes of tracking. Fixed orientation panels point at one part of the sky during the entire day. Single axis tracking allows the panels to track the sun's motion across the sky, usually from the east to the west, throughout the day. Tracking improves energy delivery and panel efficiencies by allowing rows of panels to be better able to face the sun and absorb more incident sunlight. For this project, the solar panels would be installed in a single-axis tracker system arrangement. Different tracking systems are being considered, and the selection of the tracking system would impact the height of the supports and panels. The solar panels would have 18 inches of ground clearance and have and either 8 or 15 feet high maximum tip height depending on the tracking system used.

³ PSC REF#: 442008, High Noon Solar CPCN Appendix B Equipment Datasheets.

The tracking system allows the panels to follow the movement of the sun from 60 degrees east to 60 degrees west during the day, with zero degrees being level to the ground, when the sun is directly overhead. The tracking system is usually constructed out of galvanized or stainless steel or aluminum. The supports would typically be installed by a pile driver, but the applicant may use helical piles or pre-drilled holes if conditions require. Inverters are also typically installed using driven pier foundations, similar to the supports for the solar panels, although concrete foundations may be used if soil or ground conditions require increased stability. The tracking systems being considered range from 100 to 350 feet long and can have different widths depending on the final engineering.

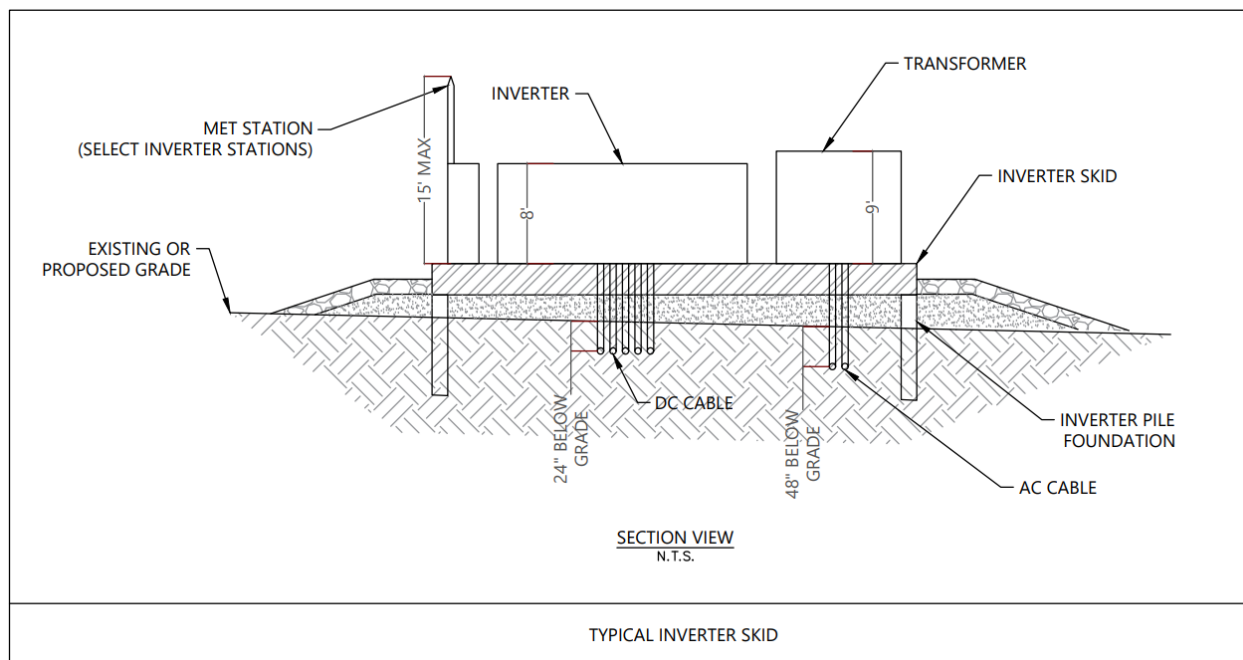
The solar arrays were designed to have between 15 to 30 feet between array rows when the solar panels are horizontal. Roads would typically be approximately four feet from the panel edges when horizontal. There would typically be a 20-foot buffer between the solar array fences to the trackers. All of these distances are subject to revision during the final project design. For the purposes of this EA, direct impacts from installation of the tracking system are considered to potentially occur within all areas shown as inside the array fences and are not limited to those areas shown specifically as hosting solar panels.

Inverters

Inverters are the devices that convert the DC power generated by the solar panels into an AC current that can be transmitted across the electric transmission and distribution system and used at residences and businesses. Inverters have an inherent DC-to-AC conversion ratio that dictates how much AC power is transformed from the DC power generated at the panels. One option proposed by the applicant was Sungrow SG3425UD-MV / SG3600UD-MV inverters, which have a stated max DC to AC ratio of up to 2.0. The initial design divided PV panels into 129 power blocks (79 proposed, 50 alternative) utilizing 4.2 MW inverters, though the number of power blocks and the capacity of the inverters are subject to change based on the specific models used. The final inverter type may vary based on equipment availability but would be similar to the one used to develop the project.

Typically, the inverter would be placed in the middle of each power block, surrounded by the solar modules and set further back from array fences. The inverters would be in enclosures that are typically 15-20 feet long, by 6-7 feet wide, by 7-8 feet tall. This is roughly comparable to a metal storage container. Transformers would be located next to the inverter enclosure, and would be approximately 10 feet long, 10 feet wide, and 8-10 feet tall. The transformers step the voltage up from the inverters to 34.5 kV before it enters the collector circuit system. The inverter and transformer would be placed on concrete pads with pile foundations set into the ground. The applicant provided a representative diagram of the typical inverter set up planned to be used for the project in Appendix C, which is shown in Figure 3. The converted power from the solar arrays would go from the inverters to underground collector circuits and eventually the transmission system.

Figure 3 Typical Inverter Skid Diagram from Appendix C of the Application



Collector Circuits

The electric cables that run through the solar arrays and bring the energy produced to the project substation are called ‘collector circuits’ or ‘collection lines’ and are typically operated at 34.5 kV. The size of the conductors is typically measured by their cross-sectional area in thousand circular mils (kCMIL). Conductors used in the project could be as large as 1,500 kCMIL. The applicant states that approximately 57 miles of underground collector circuits would be needed to connect the proposed arrays to the project substation. Approximately 12 collector circuits would be needed, depending on the final project layout. An additional seven collector circuits would be needed to connect the BESS to the project substation. The applicant states that all collector circuits would be underground and no overhead collector circuits are anticipated for the project. Fiber optic cables to connect the project to local telecommunication services would be included in the same ROW as the collector circuits.

Collector circuits would be installed through either direct open-cut trenches, directional bores, or vibratory plows, depending on the location of the line and local conditions or sensitive resources. The collector circuits would be buried at least 36 inches below the ground surface, in a triangular configuration. If open-cut trenching is used, the trenches would be approximately 12-18 inches wide, with topsoils and subsoils kept separate during trenching activities. Where multiple collector circuits run parallel to each other, the lines would be kept separated, typically 15 feet from centerline, to maintain the ampacity of the cables. Collector circuits are commonly constructed cross-country through participating parcels of land. Where they would travel longer distances between arrays, the lines are sometimes placed adjacent to roads, such as along Stewart Road. The largest number of collector circuits would cross through the north part of Array E, south of Thiele Road, as the circuits come into the collector substation just west of Array E. At this point, the ROW could be as wide as 195 feet to accommodate 12 collector circuits.

Project Substation

The proposed project would include the construction of a project substation (also referred to as a collector substation or transformer substation). The project substation would be located near the O&M building and BESS, to the south of Thiele Road, and just west of Kutz Drive. The purpose of this substation is to step up the voltage from the collector circuits from 34.5 kV to the 345 kV interconnection system voltage. This allows the power produced by the project to go onto the new gen-tie line and to the ATC Interconnection Switchyard, before joining the rest of the transmission grid. Collector circuits from the solar arrays are anticipated to enter the substation from the east, and collector circuits from the BESS are anticipated to enter from the south, pending final engineering. The gen-tie line would proceed west from the substation. The nearest residence would be approximately 865 feet northeast of the project substation, and there are no schools, daycares, or hospitals in the project area.

The substation would take up approximately four acres on the overall 40-acre parcel. The land is currently in agricultural use, but the parcel does slope to the north towards an area of wetland. Grading may be needed to create a stable area for the various equipment. After site grading, the substation facilities, such as transformers, would be constructed on hard surfaces, such as concrete pads, with gravel between concrete areas. Prior to construction and during operation, storm water and erosion control measures would adhere to the Storm Water Pollution Prevention Plan that will be developed for the project. A perimeter security fence made up of chain link fence with barbed wire, with access gate, would surround the substation facilities, as required by the National Electric Safety Code (NESC). Within the fenced area, the project substation would include:

- Three transformers, which may not be identical, ranging in size from 111/148/185 MVA to 120/160/200 MVA,
- Three 345 kV circuit breakers,
- A common 345 kV bus,
- Two independent 34.5 kV collection system buses,
- Disconnect switches for all breakers, and;
- A control building with protection, communication, and supervisory control and data acquisition (SCADA) equipment necessary to operate the substation.

In addition to the project substation, the operation of the High Noon Solar project requires the construction and operation of a new interconnection switchyard, proposed to be west of USH 51 and the Soo Line Railroad and north of Richards Road. The Interconnection Switchyard would be approximately five acres in size. This Interconnection Switchyard would be designed, constructed, and owned by ATC and fenced-in and protected according to the NESC and ATC's physical security standards. The Interconnection Switchyard would have high voltage breakers and high voltage isolation switches and would connect the High Noon Solar Project to the electrical transmission grid. A separate control building would be constructed on-site to house ATC's protection, communication, and SCADA equipment for the Interconnection Switchyard.

Generator Tie Line

In addition to the solar generation facility, the project would include the construction and operation of an approximately 1.9-mile 345 kV gen-tie line. This gen-tie line would connect the

project collector substation with the interconnection switchyard. The application provided information on two routes that the Commission could select from for the final gen-tie line route.

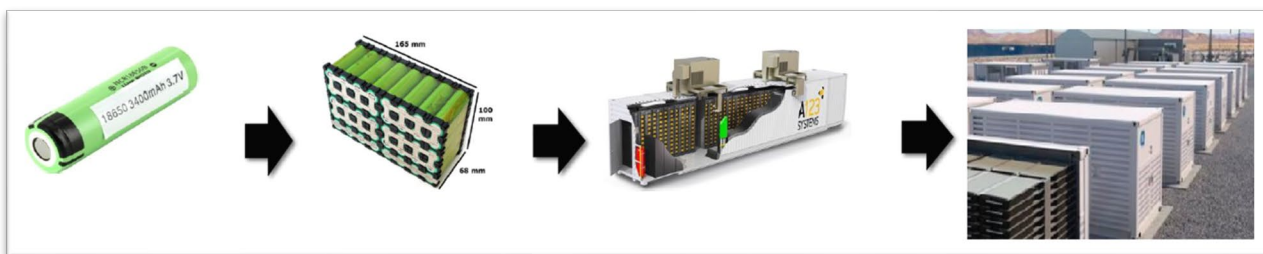
- The proposed gen-tie line route would begin at the project substation, south of Thiele Road, and west of Kutz Drive. Shortly after leaving the substation area, the line would turn north and cross Thiele Road, then turn west and proceed along the north side of Thiele Road. The proposed route would cross Goose Pond Road and continue almost due west approximately 820 feet north of Richards Road. The proposed route would cross USH 51 and the Soo Line Railroad, before joining the new Interconnection Switchyard.
- The alternative gen-tie line route would share the start and end points as the proposed route. The route would generally be similar to the proposed route, moving west from the substation on the north side of Thiele Road. The alternative route would divert on the west side of Goose Pond Road, moving north, closer to the parcel line and approximately 430 feet north of the proposed route. The alternative would start to turn southwest just before crossing USH 51, then turn more directly southwest to join the proposed route just before crossing the Soo Line Railroad. The alternative route would be closer to a non-participating residence just east of USH 51 and would be slightly longer, at 2.0 miles, with more corner structures.

The gen-tie line would be made up of single-circuit, monopole structures approximately 80 to 150 feet in height depending on the type of structure (corner structures would generally be taller). The poles are likely to be weathered steel. The gen-tie line would have an approximately 150-foot-wide ROW. Each transmission structure would permanently impact approximately 113 square feet, and all appear to be located on land currently in agricultural use. The proposed route would have 19 structures and the alternative route would have 20 structures. Corner and dead-end structures would have concrete bases, while the applicant states that most of the other structures would be directly embedded. If concrete foundations are used, the foundations can be between 3 to 8 feet in diameter and 20 to 30 feet in depth, based on soil conditions.

Battery Energy Storage System (BESS)

The proposed project would include construction of a BESS comprised of lithium-ion batteries in outdoor enclosures that have a power management system, climate control, fire suppression system and other related components. The BESS would have a maximum output capacity of 165 MW and a total maximum capacity of 660 MWh, allowing a fully charged battery to operate at maximum capacity for four hours. The BESS units are made up of many small lithium-ion batteries, joined together into groups, referred to as ‘modules’ and placed into the racks of the storage containers as shown in Figure 4. The applicant states that these containers may be located in one central area (as shown in Figure 5) or that the BESS units may be dispersed throughout the solar facility, with one or more BESS units installed at each solar inverter skid. If located in a central area, the BESS would use about 10 acres, if dispersed, the addition of BESS units near the inverters would not substantially increase the sizes of the solar arrays.

Figure 4 - Components of the BESS from individual cell to overall plant.⁴



The BESS also has inverters and medium voltage transformers used to transfer energy to and from the batteries. More information on the specific components of the BESS is described in the following sections.

Lithium-Ion Batteries

The applicant proposes to use lithium-ion batteries for the BESS in this docket. Lithium-ion batteries are a popular choice in many types of consumer electronics and other devices due to being relatively inexpensive and having high energy density.⁵ Some examples of their use in consumer electronics include cell phones, laptops, portable tools, and cameras. Larger applications of lithium-ion batteries include electronic vehicles and energy storage systems such as the one proposed in this docket. Commission staff reviewed information on the proposed lithium-ion battery technology from the applicant, as well as from the EPA, Sandia National Labs, and Department of Energy. A lithium-ion battery consists of similar components as other batteries: an anode, a cathode, a separator, electrolyte, and current collectors. These function as follows:

“The anode, or negative end of the battery cell, is usually composed of a graphite matrix embedded with a lithium compound. The anode also contains a current collector, which is often comprised of copper. On the opposite end of the cell, the cathode (or positive end) is often cobalt oxide, though other compounds (e.g., iron phosphate, sulfur, manganese oxide, etc.) can be used, depending on the chemistry of the battery. A liquid electrolyte is located between the anode and cathode, and a thin layer of polyethylene or polypropylene acts as the ‘separator’ in the middle that selectively allows the lithium-ion to pass from one side to another, creating the useful voltage that powers a device.”⁶

During the energy discharge process, lithium is oxidized at the anode, producing positively charged lithium ions and negatively charged electrons. The ions travel through the electrolyte to the cathode, where they are reduced. The electrons move through an external circuit from negative to positive electrodes. The reaction is reversed in the charging process, where the external circuit must provide energy (charge). Over time, the lithium ions are consumed slowly through parasitic reactions. This degradation, or loss of lithium ions, reduces the life and capacity of the battery over time. A battery augmentation process, where new batteries and inverters are added to the BESS over time, would be used to maintain the working capacity of

⁴ Images from Sandia Labs presentation materials.

⁵ Environmental Protection Agency. (July 2021). An Analysis of Lithium-ion Battery Fires in Waste Management and Recycling. EPA 530-R-21-002.

⁶ Id.

the BESS. The applicants states that the extra space necessary for the augmentation units has been planned for and exists in the current layout.

Each BESS unit has an HVAC system to maintain temperatures within a specified range. This climate control is important because the lithium-ion reaction produces heat which can be exacerbated by high temperatures around the battery units or outside the storage container. The batteries can experience thermal runaway reactions if not properly cooled. Thermal runaway is a condition where individual lithium-ion cells making up the battery can overheat, even in the absence of a fire. If thermal runaway occurs, it can spread to other cells in the battery, which can eventually create a condition for a fire or explosion to occur. Likewise, if the lithium-ion cells are too cold, the lithium ions are not able to flow, and the battery does not operate as intended. Maintaining the climate control systems is vital for the performance, lifecycle, and safety of the BESS.

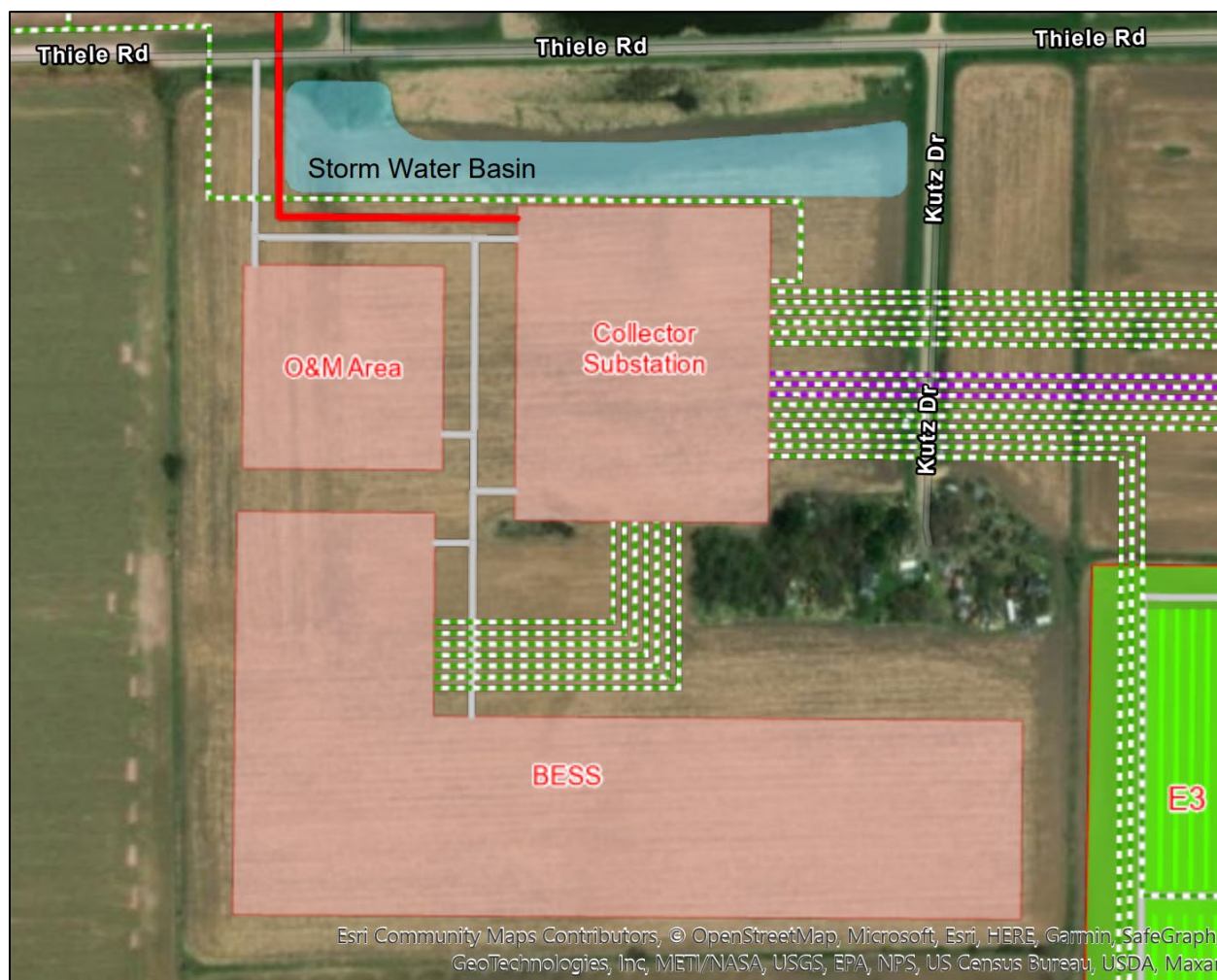
Battery Storage Units

If an AC-coupled, centralized BESS is constructed, the batteries would be placed in modular storage units located in the area indicated on the map in Figure 5. Rows of pad-mount transformers and inverters would be installed adjacent to the BESS units. The BESS units would send DC power to the inverters, which would send the converted AC power to the pad-mount transformers. The transformers would then connect to a common bus that ultimately connects to the project substation. If a dispersed DC-coupled system is constructed, the BESS would consist of one or more enclosures installed at each inverter skid, utilizing smaller, additional transforming equipment, and utilizing the same collector circuits as the solar panels to connect to the project substation. The applicant states that at this time, final equipment selection has not occurred, but some details regarding facility type are known. The batteries would be placed in racks, and the racks would be installed in modular storage units that are similar to steel shipping containers. These containers would be separated, and this containerized option, rather than installing all batteries within one larger building, is stated as one way to mitigate thermal runaway and fire propagation across the BESS. Each storage unit would be placed on a concrete foundation and the area would be kept clear of vegetation, with aggregate material between storage units, similar to a substation yard.

The applicant states that the storage units would only be accessible externally. The design of the storage units would not allow for people to enter the structures therefore, it would require they conduct any work or emergency response from outside. This would reduce one element of risk should a thermal runaway or fire event occur, as opposed to housing batteries in an enclosed structure where gasses may build up and be explosively released if an external door is opened and staff or responders enter. Fire suppression canisters and HVAC modules are incorporated into the storage unit according to the supplier's designs. The sizes of the containers provided as examples vary, with two examples shown on pages 122 through 126 in Appendix B.⁷ of the application. For one model, the storage unit would be 8 feet in width, and 9.5 feet in height, and are stated as 20 feet in length. For another model, which has smaller, more module containers, the dimensions would be approximately 8 feet in width, 10.5 feet in height, and 5 feet in length.

⁷ PSC REF#: 442008.

Figure 5 – Map showing a centralized BESS, Project Substation, and O&M Area.



Fire Suppression Systems

The main concern identified by Commission staff after reviewing the application and literature on BESS appears to be the risk of thermal runaway causing a fire. Thermal runaway often begins when a damaged battery releases energy in the form of heat, which can in turn damage surrounding batteries, which then also release energy in the form of heat. This creates a cascading event where the increase in heat causes damage, which further increases heat. Temperatures during these thermal runaway events can reach hundreds of degrees Celsius depending on battery size and materials. The National Fire Protection Association (NFPA) defines⁸ thermal runaway as:

“...the process in which a battery creates heat but cannot dissipate that heat, resulting in dynamic temperature increase. Initial signs of thermal runaway might include pressure increase at the cell level, temperature increase, and off-gassing. As the process continues, additional signs might include vent gas ignition, exploding cells, projectile release, heat propagation, and flame propagation.”

⁸ NFPA 855, Annex C.

In some batteries, a fire-retardant foam is placed between battery cells to mitigate self-heating and reduce thermal runaway potential. One of the most critical ways to prevent thermal runaway is absolute protection of the batteries during transport and installation to avoid physical damage. However, operational actions such as overcharging, fast charging, or low temperature charging can cause lithium dendrites, or metallic microstructures, to form on the battery and cause short circuits, even in the absence of physical damage⁹. Dendrite growth is influenced by current density, temperature, electrolyte type, and convection (heating) in the electrolyte.

For the proposed project, the applicant states that the BESS would include a Battery Management System (BMS) that can monitor each battery cell for conditions that indicate or lead to thermal runaway or self-heating. The BMS system would monitor the voltage, current, and temperature for each battery cell and ensure each variable is within safety margins. The BMS would be programmed to send alarms or notification to the project control center, or directly disconnect battery racks if safety margins are exceeded.

Should an accident occur or the BMS fail to operate as intended, there would be an automatic fire suppression system in place to attempt to lower the temperature of the battery cells or extinguish a fire if one is occurring. The applicant states that the fire suppression system would be aerosol-based and would not contain any per- and polyfluoroalkyl substances (PFAS). The applications states a fire suppression agent that interferes with the chemical reaction of a fire would be used, such as Stat-X¹⁰, which has a potassium based, non-toxic, and non-corrosive composition that causes chemical interference with flames. It is approved for use in energized electrical components.

NFPA 855, Annex C states that although many BESS designs incorporate the use of inert or clean agent fire suppression systems, research by NFPA and other organizations show that the cells must be cooled to stop thermal runaway. Sandia National Labs, in information presented to Commission staff, also discussed the need to have water available to reduce cell temperatures to effectively stop thermal runaway that causes fires to break out. The use of water was not discussed by the applicant in its description of response to thermal runaway or fire events. Even use of water sprinklers may have their limitations as stated in an article¹¹ by NFPA, which states:

“Water systems in lithium-ion batteries work effectively to cool the battery and can stop the spread of thermal runaway, but as soon as the faucet shuts off, heat quickly builds, and the process resumes.”

The applicant states it would follow the BESS safe design criteria specified in NFPA 855 including the creation of a comprehensive Hazard Mitigation Analysis process. As part of that process, the applicant would develop information on safe approach distances for first responders and other parts of an Emergency Response Plan (ERP). The ERP would be shared with local first responders to make clear the emergency protocols and responsibilities prior to any responders arriving on site in case of an emergency event.

⁹ Jin et al. Detection of Micro-Scale Li Dendrite via H₂ Gas Capture for Early Safety Warning. *Joule* (2020). <https://doi.org/10.1016/j.joule.2020.05.016>.

¹⁰ controlfiresystems.com/products/fire-suppression/stat-x-aerosol-generators. Accessed September 2022.

¹¹ Roman, Jesse. “Learning from Surprise”. *NFPA Journal*. July 26, 2021.

Storm Water Runoff Treatment

There would be an increase in impermeable surfaces as a result of the facilities that make up the project substation, O&M building, and BESS. The storage units, buildings, aggregate surfaces, and access roads would all result in an increase in impermeable surfaces. Impermeable surfaces increase storm water runoff, which can negatively impact adjacent wetlands, waterways, or property. The initial designs provided in the application show a storm water infiltration basin north of the O&M building and collector substation, running parallel to Thiele Road. Other temporary storm water ponds or treatment basins may be utilized across the project area to treat runoff that might occur during construction.

2.7.2 Other Project Facilities

In addition to the items needed for the operation of the solar facility, the project would include other ancillary facilities during both the construction and operation phases.

Laydown Yards/Staging Areas

Laydown yards would be needed for storing materials and equipment, vehicle parking, and hosting temporary construction offices. The main laydown yard for the project would be located on a 12-acre parcel of land just west of STH 22 and north of Maas Road, immediately to the east of Proposed Array E. Most of this parcel is in agricultural production, with a small clump of trees near the southern part of the parcel that may require removal. Observations of similar solar facilities under construction show that small staging areas across the project area are also used during construction, to provide stable areas for equipment and materials. These smaller laydown yards or staging areas are usually found on the edge of a parcel, between solar panels and the perimeter fence. The applicant states that all staging areas or laydown yards would occur within fenced array locations, along the gen-tie line ROW, or on land negotiated with participating property owners. Overall, the applicant anticipates that no more than 50 acres across the project area would be used as laydown yards or staging areas.

Laydown yards typically require removing and stockpiling topsoil and placing a layer of aggregate material down for a stable surface. Smaller sites may only have a layer of aggregate material placed down, particularly if soils are wet or soft, to prevent ruts or tracking of soils onto roads. Storm water management such as silt fence, straw wattles or bales, or sediment basins may be required to manage runoff from the site. Laydown yards are typically where refueling, maintenance, and filling/storing tanks of chemicals occurs. As such, a Spill Prevention, Control and Countermeasures (SPCC) Plan would be implemented by the applicants and their contractors in the case of any inadvertent releases of chemicals or hazardous materials.

Traffic going into and out of the laydown area would increase substantially compared to normal traffic levels, particularly at the beginning or end of the workday. The appearance of the area would shift from an agricultural field to an area with construction trailers, heavy machinery, materials storage, and parking lots. Security lighting would be installed for the duration of the laydown yard use. Noise from vehicles, including engine noise from construction machinery and delivery vehicles, would increase near the laydown yards when in use. Generally, the impacts are considered to be temporary, as once construction is complete, laydown yards are restored by removing the aggregate material, decompacting subsoils, then replacing and decompacting the

stored topsoils. Finally, the laydown yards or staging areas would be planted with an appropriate seed mix, depending on if the area is returning to agricultural use or being placed into another use such as perimeter area or solar array.

O&M Building/Structure

The applicant proposes to construct an O&M building on the same 40-acre parcel of land that would host the project substation and BESS. The land was previously farmland, with an area of non-occupied buildings and vehicles interspersed with trees on the east side of the parcel. The O&M building would be approximately 4,000 to 5,000 square feet in size, and include the following features:

- An approximately 2,700 square foot warehouse to store an inventory of spare parts and project maintenance supplies.
- Three offices for the permanent staff (up to five permanent staff anticipated), including one workspace for up to seven technicians.
- A project control center/library.
- A bathroom, including a shower.
- A breakroom, including a kitchen.
- An external parking area with space for approximately ten vehicles.
- An external gravel storage area around the O&M building, within the fenced area, of approximately two acres.
- An approximately 300-foot long, 20-foot-wide driveway from the O&M parking lot onto Thiele Road.

Specific details on the type of building design were not provided in the application, but a representative design of a similar building was included as Appendix C of the application. Security for the exterior storage area associated with the O&M facility would be made up of similar chain link and barbed wire fencing that would surround the project substation and BESS. Security cameras would be installed at the structure, and lighting at the building, which the applicant states would be down-shielded to reduce light pollution to adjacent properties. The lighting would either be turned on through a switch or motion-activated, to further reduce constant light pollution impacts to adjacent properties. The applicant would coordinate with other permitting entities, such as the DNR, to obtain permission to drill a well for water supply for the building and install a septic system for wastewater.

At the end of the solar project's operational life, the O&M building may not be decommissioned, based on the condition of the structure, its usefulness, and the intentions of the landowner.

Access Roads

The project would require access roads that would be used during the operation of the solar project, as well as some temporary access roads only used during construction. Permanent access roads are usually designed to provide access to inverters and other important facilities for maintenance and emergency response. The majority of the access roads are usually within the fenced areas of the project, and not available for the landowner to use during the operational life of the project. The applicant anticipates that 26 miles of permanent access roads would be constructed for the proposed array layout. This amount may change during final design due to

shifts in arrays, discussions with landowners, or requirements from state and local road permitting authorities. Most permanent access roads would be about twelve feet wide with four-foot-wide shoulders. These may be extended during construction to approximately 24-feet in width to accommodate vehicle traffic and equipment movement. Access to the O&M building, project substation, BESS, and interconnection switchyard would require a separate 0.29 miles of access roads. These access roads would be approximately 20-feet wide with two-foot-wide shoulders.

Access roads are typically constructed by removing, stockpiling, and stabilizing the topsoils, to reach suitable subsoils. The applicant states that work needed to construct stable roads capable of supporting the project would depend on soil types and weather. Typically, the subsoils may be compacted, and/or stabilized through blending of cement mixtures with existing soils, at depths between 6-12 inches or down as far as 2-3 feet if conditions require. Once the subgrade soils are stabilized and tested to ensure they would meet requirements, aggregate material is placed to finish the road surface, usually between 6-12 inches in depth, but potentially up to 18 inches if conditions require additional material. One item of note is that use of soil cement can negatively impact soil microorganisms, decrease soil permeability, and increase a project's CO₂ emissions due to the production of cement.

Access roads are typically the only approved entrances/exits onto local roads, and the aggregate material in part reduces the tracking of mud and other material onto local roads. Contractors should be informed on the location of approved access points, and the need for their use. If material is still being tracked out onto roads, metal grates may be placed at exits to try to remove excess mud from tires as vehicles drive over them and out to the roads.

Temporary access roads not needed after construction would have any aggregate material removed and the soil repaired after work in the area is complete. When the solar project is decommissioned, permanent access roads would be removed unless negotiated differently with the landowner. Aggregate material would be removed from the access roads and the area below would be scarified and decompacted before topsoil would be applied. Topsoil would be re-seeded with an appropriate seed mix to prevent erosion.

Project Fences

The applicant would fence off each of the solar arrays and the area around the BESS, substation, and O&M building. The type of fencing would be different depending on the facility. Arrays would typically be fenced with an up to eight-foot high "agricultural" or "deer fence" made up of woven wire. No barbed wire would be used on the array fences. Generally, this type of fencing has fewer aesthetic impacts than chain link and can provide the security needed for the solar arrays. Fence posts would generally be driven into the earth and avoid the use of concrete footings however, concrete may be needed in areas of loose soils or insufficient depth of soils.

Fences around substations, switchyards, and a BESS have different security requirements from the arrays, and those areas, as well as the O&M storage area would be fenced off with chain link fence with barbed wire. Fences around these areas would meet the requirements of the applicable codes and would likely be at least seven feet in height. The applicant states the BESS may have a solid wall constructed if a chain link fence is not used, which would in part mitigate noise impacts and may decrease visual impacts. Across the solar project, access points would be

locked, with access restricted to project employees, contractors, and emergency services. Landowners would not be allowed to access the areas within the perimeter fences.

2.8. Decommissioning

No solar PV generation facility or BESS similar to the ones proposed have reached the point of decommissioning or repowering, and the final decommissioning activities may change from the description provided in the application materials. Some of the details regarding site decommissioning are assumptions based on current knowledge and may change over time as more information and examples are available. The solar project is expected to have a 35-year operational life. After that time, the applicant may decide to extend leases and continue to operate the facilities, or may decide to repower the facilities, depending on the terms of leases with landowners. The land agreements in place with the participating landowners provide for a total operating period of 50 years. Any necessary permits would be obtained prior to an extension of the project's operational life.

A final decommissioning plan was not provided with the application materials, but general decommissioning actions and a preliminary cost estimate is discussed in Section 1.7.3 of the application. The costs provided are very high level and subject to change from a number of variables such as the value of scrap materials, the cost of fuels, and potential future costs associated with recycling or disposal. The applicant states that at the 15th anniversary of the commencement of operations, it would post a form of financial security, such as a surety bond, letter of credit, escrow account, reserve fund, parent guarantee or other suitable financial mechanism, if any net cost of decommissioning exists.

Decommissioning would include removing the solar arrays and all associated facilities from the project area. Standard decommissioning practices would include the dismantling and repurposing, salvaging/recycling, or disposing of the solar generation facilities, followed by the restoration of the site. The applicant states that some project facilities such as the O&M building, project substation, gen-tie line, and BESS may be retained or repurposed based on whether they are still useful. Decommissioning is estimated to take approximately 12 months to complete. A smaller workforce is typically used for decommissioning than the construction workforce. Any necessary permits would be obtained prior to decommissioning work being undertaken.

Underground project facilities would be removed to a depth of four feet, to allow for agricultural use of the area. Unless otherwise requested by a landowner, permanent access roads constructed for the facility would be removed. After all equipment is removed, the project area would be restored to a condition reasonably similar to its pre-construction state. Soil would be decompacted and reseeded with an appropriate mix to prevent erosion until it could be returned to agricultural use.

3. Environmental Effects

Wisconsin Admin. Code § PSC 4.20(2)(c) states that the EA must include a description of the environmental factors that the proposed project affects most directly. Wisconsin Admin. Code §

PSC 4.20(2)(d)(1) directs the EA to describe the proposed project's effects on geographically important or scarce resources, such as historic or cultural resources, scenic or recreational resources, prime farmland, threatened or endangered species, ecologically important areas, as well as the potential impacts to other environmental matters the Commission considers relevant.

3.1. Agricultural Lands

In many Commission reviews where a project would impact agricultural lands, the Department of Agriculture, Trade, and Consumer Protection (DATCP) would complete an Agricultural Impact Statement (AIS) for use during land right acquisition discussions between a farmer and utility. As a wholesale merchant plant, High Noon does not have condemnation rights and therefore is exempt from the AIS statute (Wis. Stat. § 32.035). In other solar projects proposed by merchant plants, DATCP has provided letters confirming the understanding that since there is no condemnation authority, there is no scope for DATCP to produce an AIS.

The applicant conducted a mapping review of land cover in the project area and found that approximately 95 percent of land is in row crop agricultural use. Most of this area is being cropped for corn and soybeans. The applicant states there are no U.S. Department of Agriculture (USDA) defined 'specialty crops' grown in the project area, but there are fields with heirloom corn, wheat, and rye grown for a commercial whisky business. Some areas of grassland and pastureland were also observed in the project area.

During the comment period for the Preliminary Determination letter for this EA, information was received about additional specialty crops grown in the project area. The landowner owns land south of Mud Lake Wildlife Area and north of Schoenberg Marsh Waterfowl Production area in sections 33 and 34 in the town of Lowville. The landowners have an agritourism operation that includes seasonal pick-your-own strawberries, sweet corn and peaches. The operation also includes a corn maze and pumpkin patch. They also raise produce, beef and honey from their apiary. It also includes a Christmas Tree Farm. They indicate that some of these specialty crops will be in very close proximity to solar arrays and fence lines.

Direct construction impacts to agricultural lands are anticipated to be the removal of crops, movement and potential erosion of soils, compaction and/or mixing of soils, and removal of features such as fences, drain tiles, or irrigation systems. The applicant could minimize construction impacts on agricultural soils by using one or more of the following techniques: completing construction during dry or frozen conditions; using equipment with low ground pressure tires or tracks; placing construction matting to help minimize soil and vegetation disturbance, and distributing axle loads over a larger surface area to reduce the bearing pressure on agricultural soils. Subsoils are less productive than topsoils and mixing the soil types should be avoided as much as practicable. This includes avoiding creating large ruts with vehicle tires, which can lead to soil mixing. The applicant states that any excess excavated soils would only be spread within the project area in accordance with terms of the solar lease agreements with landowners and provided BMPs that would be used to decrease impacts to soils in the response.¹² to data request ACI-1.14.

¹² See PSC REF#: 445663.

During the operation of the project, land used for solar arrays and other project facilities would no longer be available for crop production or manure disposal. Farmland leased for the project would not be available as rental cropland during the project lifespan, which might increase rental prices on other local fields due to a decreased supply. Because the land would be taken out of agricultural production, there could also be a reduced demand for agricultural products and services in the immediate area, such as seed, fertilizer, and harvesting services. If fields that make up the project were utilized for manure spreading, they would no longer be available, which may increase the amount that is applied to surrounding fields or increase the distance it would need to be transported for disposal if dairy farms in the area continue normal operations.

The potential benefits the project would have on agricultural lands include the predictable annual payments to participating landowners, which can support continuing agricultural operations on their remaining lands not leased for the project. Some landowners may use this opportunity to retire from farming, relying on the income stream from the projects. In addition, depending on the amounts and types of fertilizers, herbicides, and pesticides used during active agricultural production, using the land for a solar array would reduce or even eliminate the use of such chemicals on those lands. This reduction in nutrient and chemical applications could improve local soil and water quality and reduce impacts to non-target species such as pollinators. Having the land in the arrays planted with long-term vegetation rather than used for row crops would likely decrease soil erosion and build up topsoil during the life of the project. Water use from existing wells and irrigation systems could decrease, allowing groundwater to recharge in the project area. At the end of the project lifespan, land used to host the solar arrays could be restored to agricultural activities.

3.1.1. Conservation Reserve Program

Lands enrolled in the Conservation Reserve Program (CRP) receive a yearly rental payment in exchange for farmers removing environmentally sensitive land from agricultural production and planting species that improve environmental quality. The USDA administers the CRP program. If the lands enrolled are part of the solar development area and would need to be removed from the CRP, any early withdrawal from the program might have financial costs for the landowner. At this time, it does not appear that the USDA has a formal policy on the compatibility of solar energy facilities on lands enrolled in the CRP.

There are some parcels in the wider area enrolled in the CRP, but the applicant states that none of the land that would make up the proposed project is currently enrolled in the CRP or in another conservation program such as the Managed Forest Law (MFL) program. The project is not located in an Agricultural Enterprise Area. The land in the project area is zoned as Farmland Preservation by Columbia County. Landowners in a certified farmland preservation zoning district can claim a tax credit if they follow state soil and water conservation standards and keep the land in agricultural use. Participating landowners may be receiving farmland preservation tax benefits but no Farmland Preservation Agreements are in effect as the project is not in an Agricultural Enterprise Area.

3.1.2. Drain Tiles

Drain tiles are commonly used throughout Wisconsin to remove excess water from agricultural fields with poor drainage. Current and accurate maps of drain tiles are often hard to come by, even though their use is prevalent throughout Wisconsin. The use and location of drain tiles are usually based on soil type and topography, and in Wisconsin's rolling landscape they are commonly installed on an as needed basis, typically in low lying areas with water retaining soils. As almost all of the project would be in agricultural lands, drain tile systems may be encountered. The applicant states that it has reached out to all participating landowners to ask for any information they have on the location of drain tiles based on personal history or previous maps. The applicant may also use field location services and satellite imagery to attempt to identify drain tile systems that would be impacted by construction.

Drain tiles can be damaged during construction activities by excavation, heavy vehicle use, or pile driving in fields. Damaged drain tiles can cause slower drainage, standing water, and flooding in fields where the damage occurs, as well as adjacent fields. Slower drainage could also negatively impact vegetation establishment, which can delay closure of construction permits. It may not become clear that tiles have been damaged as a result of construction activities until after previously drained fields flood during the next heavy precipitation period, which may not occur for months or even years. The applicant states it would attempt to avoid impacts to drain tile systems by incorporating known locations into final designs, but that some impacts are anticipated. The applicant states that if damage to drain tiles would create adverse drainage effects to participating or neighboring property, it would re-route or repair the drain tiles during the construction process.

The proposed project is not located within a Drainage District. The nearest drainage district is approximately 2.2 miles to the southeast of Alternative Array W, on the other side of the Crawfish River. Separate from drainage networks, the project area has six high capacity wells and irrigation systems. Four of these facilities are on land that makes up proposed arrays, one is in an area of alternative arrays, and one is not anticipated to be impacted. A member of the public questioned what would happen to the wells if the property was hosting a solar array. As per Wis. Adm. Code NR 812.26 (4)(a)5, if an irrigation well is not used for any water supply purpose for more than three consecutive years, it would need to be filled and sealed. One of the reasons for the requirement to fill and seal inactive wells is to prevent an unused well from being a conduit for contamination. In response to data request PSCW-STS-2.5, which asked about plans for these wells, the applicant stated that it has discussed potentially impacted wells with the respective participating landowners and has made arrangements in the land contracts regarding the removal of aboveground irrigation facilities and responsible closure of high-capacity irrigation wells. The applicant states it would conform to all criteria set forth under Wis. Adm. Code NR 812.26 (4)(a)5, and other applicable codes regarding the use or closure of these wells and irrigation facilities.

3.1.3. Prime Farmland

Farmland soil is classified by the USDA based on its ability to produce crops, with some soils classified as "prime". Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for

these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

Prime farmland includes Class I, II, and III soils, as defined by the NRCS. Class I soils have the fewest limitations regarding agricultural land capabilities. Class II soils have moderate limitations, and Class III soils have more severe limitations and require moderate conservation practices. Although Class I, II, and III soils are best for agricultural purposes, some of these soils have other conditions that disqualify them from readily being prime agricultural land.

The 2017 Agricultural Census found that as of 2017, there were 304,058 acres of farmland in Columbia County, approximately 60 percent of the land area. The project area (4,355 acres) makes up approximately 1.4 percent of the agricultural land in Columbia County. Of this acreage, the applicant states that approximately 1,928 acres would be required to host the proposed solar generating facilities, which would be approximately 0.63 percent of the agricultural land in Columbia County.

The applicant states that approximately 80 percent of the project area has soils classified as 'prime farmland' by the NRCS. Out of the 4,355 acres that make up the project area, the NRCS designates 3,547 acres as prime farmland. The applicant states that approximately 1,713 acres of this prime farmland would be removed from agricultural use during the operational life of the project. For context, as of 2019, there are 14.3 million acres of agricultural land in Wisconsin and approximately 7.7 million acres of prime farmland in Wisconsin. Columbia County has approximately 295,439 acres of prime farmland. Removing approximately 1,713 acres of prime farmland would equal approximately 0.58 percent of the prime farmland in Columbia County for the operational life of the project.

3.1.4. Stray Voltage

Stray voltage is a term used by the Commission to describe a physical phenomenon that may affect confined livestock, primarily dairy cows. Electrical systems, including farm systems and utility distribution systems, are grounded to the earth to ensure safety and reliability, as required by the National Electrical Safety Code and the National Electrical Code. Because of this, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage. If the voltage reaches sufficient levels and an animal comes into contact with a grounded device, a current will flow through the animal and it is considered stray voltage. Animals may then receive a mild electrical shock that can cause a behavioral response. At low voltages, an animal may flinch with no other noticeable effect. At higher levels, avoidance or other negative behaviors may result. Stray voltage may not be noticeable to humans.

Stray voltage can be caused by the operation of transmission lines in close proximity and parallel to a distribution line. To minimize the chance of stray voltage, utilities sometimes propose relocating or burying distribution lines for transmission line projects. The Commission has information on stray voltage testing and mitigation on its website in a publication on the environmental impacts of transmission lines. The Commission developed this information and its testing protocols during dockets 05-EI-106 and 5-EI-115. Similar concerns about stray voltage have been raised in both wind and solar generation projects. For transmission line and wind energy projects that are reviewed by the Commission, an order condition that requires stray voltage testing at farms located within a half-mile of the facilities is commonly included. This order condition has also been included in each of the orders for solar energy facilities already approved by the Commission. The pre-construction stray voltage testing is protective for local farmers, and also the applicant, and helps in preventing potential future litigation over stray voltage concerns.

The suggested language for this order condition would be:

The applicant shall work with the applicable distribution or transmission utility to test for stray voltage at each agricultural confined animal operation within a half mile of project facilities, prior to construction and after the project is energized. The applicant shall work with the applicable distribution or transmission utility and farm owner to rectify any identified stray voltage problem arising from the construction or operation of the project. Prior to testing, the applicant shall work with the applicable distribution or transmission utility and Commission staff to determine where and how it will conduct the stray voltage measurements. The applicant shall report the results of its testing to Commission staff.

It is worth noting that this testing protocol would be offered to all owners of confined animal operations, not limited to confined animal feeding operations (CAFO) defined by the DNR as facilities with over 1,000 animals. Previous project testing has been offered to farms with far fewer animals, again, to protect both the farmer and the applicant from future problems or litigation.

The applicant states that by ensuring engineering meets applicable electrical codes, stray voltage is unlikely to be an issue for local agricultural operations. The application identifies one known confined animal dairy operation near Proposed Array E. A review of GIS information, including aerial imagery and DATCP information on known dairy producers, show there are multiple operating farms in the project area that are within a half mile of project facilities.

3.2. Air Quality

Temporary, localized impacts to air quality would occur during the construction phase of the project. These impacts would be a result of construction machinery and delivery vehicles in the project area. Diesel engines can create exhaust impacts that are typically short term in nature, but can be a nuisance or, in high enough quantities, a health hazard. Keeping vehicles and construction equipment in good working order is one way to mitigate these impacts. These vehicles and construction machinery also generate greenhouse gases (GHG) which can contribute to climate change, however, the amounts of GHG produced during construction,

operations, and decommissioning of the project are anticipated to be a fraction of GHG from fossil fueled generation sites that are displaced by the solar facility.

Fugitive dust may be generated from excavation or grading work, exposed soils, or materials transport, and could create a nuisance for local homeowners or drivers. Fugitive dust is made up of particulate matter that can be inhaled into the lungs and is hazardous to human health, particularly for sensitive receptors such as the young, sick, or elderly. Fugitive dust clouds can impact visibility on roads and settle onto vegetation. The extent of fugitive dust generated during construction would depend on the level of construction activity, weather conditions such as high winds, and the moisture content and texture of soils being disturbed. High winds and dry conditions increase the chance of fugitive dust affecting air quality. Watering exposed surfaces and covering disturbed soils with quick-growing non-invasive plant species can reduce the chance of fugitive dust. The applicant should ensure that all contractors working on the project have plans in place to monitor for and proactively prevent fugitive dust.

During operation of the BESS, there are no anticipated air quality impacts as a result of normal operation. Recent articles about accidents at BESS facilities and cars with lithium-ion batteries described the range of hazardous gases that may be emitted during a thermal runaway or fire event. Those gases could include mixtures of hydrogen, carbon monoxide, carbon dioxide, other hydrocarbon gases, such as methane and propane¹³. The quantities and types of any pollutants emitted in this way would depend on the type of battery, the quantity of batteries grouped together or impacted, whether or not the thermal runaway control or fire suppression equipment functions as intended, and the duration of any event. NFPA 855, Annex C states that during a thermal runaway or fire, responders should be prepared for toxic and potentially explosive gas release, and that responders use their full suite of personal protective equipment and breathing apparatus when responding. The applicant states that the storage enclosures or containers would have a fire protection system that would contain and extinguish incipient fires. The fire suppressant would be an environmentally friendly agent, such as FM200, Stat-X, or F-500, that extinguishes fire by interrupting the chemical reaction pathway. As part of regular maintenance, High Noon Solar would monitor and refill/replace the suppression agent and other parts of the fire suppression system.

No air quality impacts would be expected to occur once construction of the solar facility is complete and operational. Solar PV facilities generate energy without the creation of regulated pollutants or carbon dioxide. Under normal operation, no air emissions are anticipated to be generated by the BESS. The use of this project as an energy source may reduce electric generation at sites that produce air pollutants, and lead to a reduction in those pollutants at a wider environmental scale. Commission staff are unaware of any official analytical methodology or quantitative criteria for determining the reduction of GHG attributable to a specific renewable energy project. The applicant provided an analysis of emission reductions as Appendix R¹⁴ of the application using two EPA tools (eGRID and AVERT) and the DNR's air emissions information. This analysis calculated that based on an estimate of annual energy

¹³ Baird et.al. 2019. Explosion Hazards from Lithium-Ion Battery Vent Gas.

¹⁴ PSC REF#: 442072

produced by the project of 600,000 MWh per year, it would reduce emissions of CO₂ by 561,190 tons per year (using the AVERT model).

3.3. Electromagnetic Fields (EMF)

Electromagnetic fields consist of an electric field and a magnetic field. The generation, delivery, and use of electricity produces both electric and magnetic fields. Electric fields are created by electrical voltage and are usually measured in kilovolts per meter (kV/m), measuring the change in electrical voltage over a distance. Magnetic fields are created by electric currents and are measured in units of milli-Gauss (G). Electromagnetic fields typically decrease in strength as distance from the source increases. Electrical facilities, such as power lines, produce electric and magnetic fields during operation. In addition to power lines, exposure to electric and magnetic fields comes from multiple sources in our daily lives. Typical magnetic field strengths of typical household appliances can be found in Appendix U of the application¹⁵ and in an EMF publication¹⁶ produced by the Commission, examples of which are shown in Table 2 below.

Table 2 – Examples of Magnetic Fields generated by household items at two distances.

| Sources* | Distance From Source | |
|--------------------|----------------------|-------------------|
| | 6 inches (mG) | 24 inches (mG) |
| Microwave Ovens | 100 - 300 | 1 - 30 |
| Dishwashers | 10 - 100 | 2 - 7 |
| Refrigerators | Ambient - 40 | Ambient - 10 |
| Fluorescent Lights | 20 - 100 | Ambient - 8 |
| Copy Machines | 4 - 200 | 1 - 13 |
| Drills | 100 - 200 | 3 - 6 |
| Power Saws | 50 – 1,000 | 1 - 40 |

* Different makes and models of appliances, tools, or fixtures will produce different levels of magnetic fields. These are generally-accepted ranges.

Neither the Federal government or the State of Wisconsin impose standards limiting occupational or residential exposure to 60-Hz EMF. The Commission's Standards and Recommendations state that where practical, EMF reduction techniques are followed.

Consulting Engineers Group (CEG) conducted an analysis of the estimated magnetic profile of the proposed collector system for the Project by using the 3D EMF calculator within PLS-CADD, based on Electric Power Research Institute and Institute of Electrical and Electronics Engineers methods. CEG modeled the proposed underground collection circuits sized at 1,250 kCMIL, performing EMF calculations for one-to-nine and 18 circuits constructed in parallel,

¹⁵ PSC REF# 442077, High Noon Solar CPCN Appendix U EMF Study.

¹⁶ EMF – Electric and Magnetic Fields. Public Service Commission of Wisconsin. Accessed at: [/psc.wi.gov/Pages/ServiceType/Energy/EMF.aspx](http://psc.wi.gov/Pages/ServiceType/Energy/EMF.aspx) on October 28, 2022.

each circuit approximately 15 feet apart. Underground cables were modeled with a maximum load of 465 Amps (A) each. CEG modeled the project's proposed gen-tie line at 795 kCMIL and performed additional modeling in locations wherein the gen-tie line would intersect or run parallel to pre-existing bundles of overhead conductors. Overhead conductors were modeled with a maximum load of 820 A.

As previously discussed, the proposed underground collector system for the project is designed to have approximately 19 circuits, all of which would be rated at 34.5 kV and use conductors up to 1,500 kCMIL in size. These circuits would use cross-linked polyethylene cable and would be buried at least three feet beneath the ground surface, allowing earth cover above the cable and the metallic shielding around the conductors to effectively shield the circuits from producing any above grade electrical field. From the results, CEG predicts that the underground circuits produce a maximum magnetic field of 30.57 mG, measured zero feet from the centerline, when three circuits are constructed in parallel. CEG predicts that the magnetic field produced by the overhead gen-tie line is strongest five feet away from the centerline, measuring at a maximum of 150.25 mG, while its electric field would be strongest 15 feet from the centerline, measuring 6.8 kV/m.

3.4. Endangered Resources

The state's Endangered Species Law, Wis. Stat. § 29.604, makes it illegal to take, transport, possess, process, or sell any wild animal that is included on the Wisconsin Endangered and Threatened Species List. In addition, it is illegal to remove, transport, carry away, cut, root up, sever, injure or destroy a wild plant on the Wisconsin Endangered and Threatened Species List on public lands. Although utility practices are exempted from the taking prohibitions of listed plant species on public lands, it may still be prudent for the applicant to actively avoid activities in certain areas that are known to host rare plants. The Federal Endangered Species Act (ESA) protects all federally listed animals from direct killing, taking, or other activities that may be detrimental to the species. Federally listed plants have similar protection, but the direct killing or taking prohibitions are limited to federal lands or when federal funds/permits are necessary. In addition, there may be other state and federal laws protecting rare species including the federal Migratory Bird Treaty Act, the federal Bald and Golden Eagle Protection Act, and the Protected Wild Animals (NR 10.02 WI Admin Code).

"Endangered resources" is a term that includes endangered, threatened, and special concern species, as well as certain natural communities and animal concentration sites. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. At the state level, "Special Concern" refers to those species where some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered. The applicant conducted reviews at both the state and federal level to determine what, if any, actions may be required or recommended to avoid and/or minimize impacts to federal and state endangered resources. A summary of the endangered resources reviews is provided in this section.

3.4.1. Federally-listed Endangered Resources

Northern Long-eared Bats

Northern long-eared bats, as well as other state-protected bat species, may use parts of the project area for summer habitat, particularly areas with trees. Female bats and their young are vulnerable to mortality during the maternity period because of their use of trees for maternity colonies, and the inability of young bats to fly for several weeks after birth. Per the state ER Review referenced below, no known roosts or hibernacula were identified within or adjacent to the solar facility. However, identification of maternal roost trees used by bats is very difficult and very few across the state are known and mapped. The absence of any mapped roosts on the Natural Heritage Inventory (NHI) should not be interpreted as meaning there are no bats present in local woodlands.

There are avoidance measures that can reduce potential for impacts to northern-long eared and other bat species, including a time of year restriction on tree clearing activities. USFWS recommends that tree removal occur between November 1 and April 1 or at minimum avoid removing trees outside of the pup season (June 1- July 31). This time of year restriction is commonly recommended for construction projects and can benefit not only roosting bats, some of which may be endangered resources, but also nesting birds. In Wisconsin the suggested tree clearing restriction period to avoid impacts to roosting bats is from June 1 through August 15, as per the DNR¹⁷.

Karner Blue Butterfly High Potential Range

The Karner Blue Butterfly (KBB) is a federally-endangered species that is dependent on its habitat and food plant, wild lupine, for persistence. This project is not currently located within the High Potential Range (HPR) for this species; however with the recent records of this species, it will likely be included in the future. The HPR was developed through a model to identify areas where the KBB has the highest probability of occurring. Wisconsin has a statewide Habitat Conservation Plan (HCP) that was prepared by the DNR and 25 partner organizations that identifies how any destruction or harm (“take”) of the species will be reduced and the actions that will be used to compensate for any “take” that occurs. The applicant pre-emptively completed lupine surveys, the host plant for the Karner, in areas adjacent to the known observation and no plants were found so no further actions are needed for the KBB. However, it would still be recommended to include wild lupine with the restoration seed mix to increase the amount of habitat available for the Karner Blue Butterfly.

Rusty Patched Bumble Bee High Potential Zone

A small portion of this project overlaps the Rusty Patched Bumble Bee (RPBB) High Potential Zone and may contain suitable habitat for the bee. Recommended (voluntary) follow-up actions for the rusty patched bumble bee include:

¹⁷ Wisconsin DNR, Northern long-eared bat species guidance. Accessed at: dnr.wi.gov/files/PDF/pubs/er/ER0700.pdf

- use native trees, shrubs and flowering plants in landscaping,
- provide plants that bloom from spring through fall (refer to the USFWS RPBB Midwest Plant Guide), and;
- remove and control invasive plants in any habitat used for foraging, nesting, or overwintering.

3.4.2. State-listed Endangered Resources

An Endangered Resources (ER) Review was completed for the proposed project in this docket (ER Log #21-616). The ER Review is based off information from the NHI database, maintained by the DNR Bureau of Natural Heritage Conservation. The purpose of the ER review is to use the NHI database to identify any known endangered, threatened, or special concern species, natural communities, or animal concentration sites within and near a project area. The construction area and buffers (one-mile for terrestrial and wetland species, two-miles for aquatic species) are reviewed for any endangered resources records. The NHI database contains known records for endangered resources. However, most areas of the state have not been surveyed extensively or recently, so the NHI data should not be solely relied upon, particularly in areas dominated by private lands. In areas where suitable habitat exists for protected species, but occurrences have not been recorded in the NHI database, there may be recommended activities that could mitigate or avoid potential impacts to protected species.

If approved, this project would begin construction over a year from the Certified ER Review date. DNR regularly updates the NHI database as new species records are discovered or when known populations are updated. Also, any species delisted will be removed from the database. If the project is approved, the applicants should conduct an updated review closer to the construction start date to determine if any changes to the ER Review would be needed. An ER Review should also be completed annually for ongoing maintenance and mowing activities.

The ER Review for the High Noon Solar facility determined there are several species located within the search buffers of the proposed project. While many of these endangered resources would not be impacted, a total of seven species may be impacted if actions are not put into place to prevent or minimize these impacts. They include:

- Three state endangered and two special concern bird species
- One state endangered and one special concern herptile species

The DNR provided required and recommended actions for each bird and herptile species. 'Required actions' represent the DNR's best available guidance for complying with state and federal endangered species laws based on the project information provided by the applicant and the endangered resources information and data that is available. 'Recommended actions' are those the Department strongly encourages to help prevent future endangered resources listings and protect Wisconsin's biodiversity for future generations. In the past, on a case-by-case basis, the Commission has required an applicant to undertake a DNR-recommended action in order to mitigate the environmental impacts associated with a project.

Based on the information available from the DNR, the initial project layout, and planned activities as described in the application, this project is not expected to have a significant impact on endangered, threatened, or special concern species if the following actions are implemented. If the required actions cannot be implemented, then the applicant must apply for an Incidental Take Authorization which would allow the project to “take” some individuals so long as minimization and mitigation measures are put into place.

- Birds: where suitable habitat is present, avoid impacting this habitat during the species’ specific nesting season. Alternatively, presence/absence surveys can be completed to determine if each of these species is present. If not, then timing restrictions are not required. If so, then timing restrictions must be followed.
- Endangered Herptile: While suitable habitat is not present within the project area within one mile of the known occurrence, it is present immediately adjacent to the project area. Should this species be incidentally found on site, WDNR should be contacted immediately to determine next best steps.
- Special Concern Herptile: Suitable habitat for this species can be found throughout the project area and a combination of herptile exclusion fencing and/or project timing should be used to avoid or minimize impacts to this species. In addition, the use of wildlife permeable fencing should be used when within or adjacent to suitable habitat as described in Section 3.22 of this EA.

In previous Commission construction dockets of various types, the Commission has required that the project applicants implement DNR – recommended actions for the purpose of avoiding or minimizing impacts to natural resources and wildlife. In this case, the special concern herptile does have suitable habitat in many areas adjacent to the project area. It would be beneficial in this case for the applicants to implement this particular recommended action, and the Commission could find it reasonable to require it.

During earlier discussions in large scale solar projects, the Commission has directed staff to reach out to research institutions and developers/utilities to inquire about options for research relating to potential avian impacts at these facilities. This particular project is located adjacent to high quality habitat for avian species. There may be excellent opportunities at this site where a collaborative group including a nearby university could implement beneficial research into potential benefits and impacts to avian species associated with the development of large scale solar facilities.

3.5. Environmental Justice and Sensitive Receptors

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Historically, communities of color and low-income communities have been disproportionately impacted by adverse human health and environmental effects associated with pollution and developments. The first step towards evaluating whether a project may have disproportionate impacts is by evaluating the population

in a project area. For the proposed project, local census data was reviewed to determine whether any identifiable groups of minority or low-income persons are in the project study area.

Table 3 - Population and Income (2020 data from census.gov)

| Location | Columbia County | Arlington | Hampden | Leeds | Lowville |
|-------------------------|------------------------|------------------|----------------|--------------|-----------------|
| Population | 58,490 | 844 | 581 | 755 | 1,017 |
| Median Household Income | \$69,262 | \$90,000 | \$83,214 | \$78,947 | \$79,813 |
| Poverty Rate | 6.7% | 1.6% | 2.4% | 4.1% | 7.0% |

Table 4– Estimated Racial or Ethnic Distributions (2020 data from census.gov)

| Race or Ethnic Group | Columbia County | Arlington | Hampden | Leeds | Lowville |
|--|------------------------|------------------|----------------|--------------|-----------------|
| White, not Hispanic or Latino | 91.3% | 93.7% | 91.6% | 93.6% | 95.6% |
| Black or African American | 2.1% | 0.8% | 0.7% | 0.4% | 0.1% |
| American Indian & Alaska Native | 0.8% | 0.1% | 0 | 0.8% | 0.5% |
| Asian | 0.8% | 0.6% | 0.9% | 0.8% | 0.8% |
| Hispanic or Latino | 4.0% | 3.3% | 2.8% | 2.9% | 1.8% |
| Multiracial | 1.6% | 4.6% | 5.5% | 2.7% | 3.1% |
| Native Hawaiian & Other Pacific Islander | 0.1% | 0 | 0 | 0 | 0 |

For the purposes of this analysis, a minority population consists of any geographic area in which minority representation is greater than the national average of 30 percent. The median household income for the State of Wisconsin is \$67,125. The State of Wisconsin persons in poverty rate is

10.8% (Census, 2020). Through a review of the population details available, there are no disproportionately high minority populations or low-income populations identified in any of the communities that would host the proposed project. In addition, the EA finds there are no significant adverse impacts expected to occur to human health or communities, and therefore no disproportionate impacts to minority or low-income populations are anticipated.

Sensitive receptors are mainly those individuals that are very young, elderly, or infirm. Local day care facilities, schools, hospitals, and elderly care facilities could have a greater potential to be affected by construction impacts such as fugitive dust, increased noise, and increased traffic hazards. The applicant provided information that showed the locations of the project facilities with other sensitive sites such as those mentioned. No hospitals, day cares, or nursing homes are within a mile of project facilities. There is one school, the Arlington Early Learning Center, located 0.9 miles southwest of Alternative Array Q1. The school is on the far side of the Village of Arlington from the solar project, and not located on any anticipated haul routes. No impacts to sensitive receptors are anticipated as a result of the proposed project.

3.6. Forested Lands

For the purposes of this EA, forested areas are considered any forested/wooded landscape (greater than 20% canopy cover) including forested wetlands and riparian areas adjacent to waterways; it excludes narrow windbreaks located between agricultural areas. The project area is part of the Southeast Glacial Plains ecological landscape. Forested areas make up only 11 percent of this ecological landscape and are often made up of isolated woodlots of maple-basswood, oak, lowland hardwoods, and conifer swamps. The Columbia County Comprehensive plan, as of 2013, states that woodlands cover over 89,000 acres in Columbia County, or about 17.5 percent of the total county land area.

The applicant evaluated the dominant vegetative communities through aerial imagery and a field reconnaissance. This review found that upland forests in the area are typically composed of a combination of red oak (*Quercus rubra*), white oak (*Quercus alba*), bur oak (*Quercus macrocarpa*), sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*) and elms (*Ulmus* spp.) as well as other successional forest species. For the most part, the upland forested habitat is located along waterways and wetland complexes or is a woodlot associated with agricultural property.

The applicant states that forested land makes up approximately 63 acres within the 4,355 acre project area (approximately 1.4 percent of land cover). The applicant quantified the amounts of forested land impacts by facility type in Appendix O – PSC Solar Impact Table, an excerpt of which is shown in Table 5 of this EA.

Table 5 Forested land impacts by facility type

| Facility Type | Acres of Forested Land Impacts |
|----------------------------------|--------------------------------|
| Proposed Arrays | 0.25 acres |
| Alternative Arrays | 0.45 acres |
| Collector Circuits - Proposed | 1.03 acres |
| Collector Circuits - Alternative | 0.73 acres |
| Substation/BESS/O&M area | 0.11 acres |

An approximately three-acre forested area in Proposed Array O would be within the array fenceline and surrounded by solar power blocks. The applicants stated in response to data request PSCW-STC-2.1 that there may be some tree clearing or trimming in that forested area if needed to prevent shading of nearby solar panels. During the operational life of the project, the forested area would be monitored and maintained to avoid establishment of invasive species.

The gen-tie line routes do not cross forested land but do cross windbreaks or tree lines associated with the Soo Line Railroad and the area along Thiele Road near the project substation. Some incompatible tree species in this area would need to be removed during construction, and the ROW may require ongoing tree removal during the operational life of the project. The applicant states that as part of construction, clearing of vegetation in the ROW would be in accordance with permit conditions and the construction schedule.

If tree clearing activities occur outside of the summer avoidance period of June 1 – August 15 it would reduce impacts to roosting bats, nesting birds, and actively growing vegetation, as well as reduce the risk of spreading tree diseases and pathogens. The applicant states that tree clearing would be conducted outside the period of June 1 to July 31 to reduce project-related impacts to roosting and nesting habitat. Overall, there are no significant areas of forested land clearance associated with the project. The project is sited to avoid impacts to any contiguous forest blocks, and generally avoids any smaller fragmentation of forested areas.

3.7. Geology and Hydrology

The project is located in central Wisconsin, in south-central Columbia County. The project area is predominantly located in the far western part of the Southeast Glacial Plains ecological landscape, right at the boundary with the Central Sand Hills ecological landscape, as categorized by the DNR. The landforms of the area are made up of glacial till plains and moraines made up of materials deposited during glaciation. Marshes and small lakes are dispersed through the area. Many of the original areas of grasslands have been converted to agricultural fields.

3.7.1. Preliminary Geotechnical Investigation

A preliminary geotechnical investigation of the project area was conducted by Terracon Consultants, Inc. (Terracon) and the report was provided as Appendix I¹⁸ of the application. Terracon conducted twelve test borings and six pile load testing locations in the project area. In addition, corrosion testing, thermal resistivity and electrical resistivity tests were done on soil samples. The results of the various tests were analyzed based on the proposed project as described to Terracon.

The report stated that topsoils ranged from approximately four to nine inches in thickness over subsoils that were made up of stiff to very stiff lean clays and sandy lean clays underlain by silty sand, sandy silt, or sand with varying gravel contents. As the project is so close to the central sand plains, it is not surprising that at some of the test borings there were no clay soils, and sand and silty sand were observed for the entire depth of the soil bore. Terracon observed bore refusal on possible cobbles and boulders or shallow bedrock from 8 to 17.5 feet below ground surface. Terracon reviewed local depth to bedrock maps and well construction logs and anticipates that bedrock depths range from about 5 feet below ground surface to over 100 feet below ground surface across the project area. The applicant anticipates a need to pre-drill some of the pile locations to mitigate the risk of pile refusal. Additional geotechnical investigations prior to final design and construction would seek to identify areas where pre-drilling may be necessary.

Groundwater was only observed at two of the test bore locations, at three and seventeen feet. The report states that it is likely that groundwater levels during construction would be similar to those observed during testing. Groundwater can fluctuate due to seasonal variations in rainfall and runoff, therefore can change between testing and construction start, or during construction. The applicant may need to have plans to dewater trenches or other excavations, particularly if there are times of heavy precipitation or areas of poor drainage.

The soils in the project area are susceptible to frost heave, and proposed facilities could experience heaving and settlement. Piles would need to be driven to a point where frost heave would not substantially impact the facility. Terracon stated that PV array piles may need 10-17 feet of embedment to reduce risk of frost heave. The applicant states that it is considering the use of helical pile designs which may not need that depth of installation. The applicant states that a final geotechnical study including pile load testing would be completed prior to construction, and that a structural engineer would review this study and proposed designs to mitigate frost heave risk. If the risk of frost heave is not accounted for, increased repairs would be necessary as piles might shift separately and damage solar panels, inverters, or supports.

3.7.2. Soil Erosion and Storm Water Management

The project area is generally flat with some rolling hills. The applicant states that it would avoid to the extent practicable any grading changes that would affect land use or water flow directions or rates. The applicant has not completed final site engineering to a point where the amount of cut and fill or mass grading can be quantified. Generally, the applicant states that cut and fill

¹⁸ PSC REF#: 442046.

would not substantially change the topography of the site. Large amounts of soil disturbance associated with mass grading can cause soil erosion or storm water runoff. The applicant states that ground cover vegetation may be applied to the site after harvest and prior to construction to stabilize soils. Soil disturbance could then be done in a sequential system to manage the amounts of loose soils at any given time during project construction.

The project must meet Wisconsin Pollutant Discharge Elimination System (WPDES) storm water regulations as established by the Clean Water Act and regulated by the Wisconsin DNR. The DNR's Storm Water Discharge Permit Program is administered under the authority of Wis. Admin. Code ch. NR 216. The project involves an increase in the impervious surfaces across the project site through increased aggregate surfaces for roads, as well as the substation, O&M building, BESS, and associated parking area. Post-construction runoff from these types of sites is typically managed with swales and drainage basins and should be modeled separately from the solar array areas. Solar panels are also considered disconnected impervious surfaces which could concentrate runoff and have potential to cause erosion and increased runoff from the site. Erosion and runoff issues can be minimized by spacing arrays to maintain vegetation between and underneath panels as well as establishing a maximum panel height from the ground of less than 10 feet.

Well-maintained vegetation between and underneath solar panels can minimize water scour or erosion from driplines, filter runoff, and improve infiltration capacity of the soil. Infiltration of storm water typically improves in areas where row cropland is converted to grassland. Vegetation under and around the arrays requires long-term maintenance for the lifetime of the facility, as it is the primary means of managing post-construction storm water runoff. The exact amount of increased impervious surface would be determined in final engineering design of the site and would be discussed in the Storm Water and Erosion Control Plan submitted to the DNR as part of the permit application under Wis. Stat. § 30.025 and Wis. Admin. Code ch. 216.

3.8. Grasslands

For the analysis in this EA, the term grasslands refers to both agricultural grasslands such as hay fields, fallow fields, or pastures, as well as non-agricultural grasslands such as prairies. The adjacent area outside of the project area has some large grasslands including restored or remnant prairies associated with properties owned and/or managed by the USFWS, Madison Audubon Society, Pheasants Forever, or Wisconsin DNR. These areas are made up of wetland grasslands and prairies used for waterfowl production areas as well as upland grasslands and prairies. The project area was part of the historic "Empire Prairie" and historically, this part of the state would have been home to many acres of marshland and prairie, much of which was converted to agricultural use.

The applicant evaluated the dominant vegetative communities in the project area through aerial imagery and a field reconnaissance in autumn of 2021 and spring of 2022. During this field verification, the applicant found that grassland areas within the project area generally consisted of small plots not utilized for crop production. This study found that grasslands along field edges or within agricultural fields were dominated by Kentucky bluegrass, (*Poa pratensis*),

smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*), and yellow foxtail (*Setaria pumila*). Currently, less than 0.1 percent of the project area is classified as ‘non-agricultural’ grasslands (three acres).

Minor impacts to grasslands are anticipated during construction. Contractors may remove vegetation for site grading or to allow construction equipment to access and install facilities including access roads, collector circuits, and arrays. Some grasslands may have populations of invasive species or noxious weeds that would need to be controlled to prevent their spread through solar arrays or onto adjacent properties. The vegetation management strategy provided as Appendix K of the application discusses the vegetation maintenance and monitoring requirements for both the short and long-term persistence of the ground cover vegetation. This includes cutting vegetation and treating areas with broadleaf herbicides as needed during the operational life of the project.

Solar arrays would impact relatively small amounts of grassland habitat through the project area. The land cover impact table provided by the applicants states that only 0.09 acres would be impacted by the proposed arrays, and 0.36 acres would be impacted by the alternative arrays. Other facilities such as access roads and collector circuits are anticipated to have minimal impacts to local grasslands. Approximately 2.6 acres of grassland in the project area is not anticipated to be directly impacted by project facilities but may be between arrays or adjacent lands.

Grassland habitat in the project area is expected to increase substantially as a result of the proposed project. The types of plant species proposed for planting in the arrays, and the ongoing management of the project facilities would encourage grasses and other low growing, non-woody plant species. The additional grassland areas could create suitable habitat for species of birds, small mammals, reptiles, and pollinating insects that may not find the current agricultural fields suitable for life-cycles such as reproduction. To avoid negatively impacting these species after this grassland habitat is created and species may be present, maintenance activities such as mowing should be scheduled outside the breeding/nesting season as much as is feasible.

3.9. Hazardous Materials and Solid Waste

During construction of the project there would be solid wastes generated through normal project installation and staff use of the site. Hazardous materials would be used during the construction and operation of the project. The public and local communities have raised concerns on how to dispose of any hazardous materials or solid wastes during the decommissioning of solar arrays and large BESS sites. How these materials would be treated over the lifetime of the project may change, but generally, what is known about these impacts is discussed in this section.

3.9.1. Hazardous Materials

During the construction phase of this project, there could be spills of potentially hazardous pollutants such as diesel fuel, insulating oils, hydraulic fluid, drilling fluids, lubricants, and solvents. These materials would be used during construction of the facilities or during the refueling and maintenance of equipment and vehicles. Herbicides could be used during construction or operation of the facilities. These various substances would need to be kept onsite in limited quantities and brought in as required. The contractors selected would be required to

prepare a SPCC Plan that would describe measures to be used to prevent spills or releases of hazardous substances, as well as response and cleanup procedures. Spill kits and staff training in the use of these materials would decrease the risk of spills leading to site or water contamination.

Solar Arrays

Concerns have been raised by the public regarding potentially hazardous materials contained in solar PV panels and the potential exposure to these materials as a result of the construction and operation of the proposed project. Concerns have also been raised about the future disposal of the solar PV panels, with discussion on amounts of waste, as well as potential for hazardous materials to leach from panels if placed in landfill. During the operational phase of the project, the panels are considered to be at low risk of releasing hazardous materials into the environment due to small amounts of heavy metals in proportion to the overall panel and the encapsulation of these materials due to panel design. The State of California Department of Toxic Substances Control finds that solar panels are constructed to withstand environmental conditions to last up to 30 years, which requires durability and structural integrity. The hazardous materials that may be found in the solar panels, including the toxic metals (e.g., lead, copper, cadmium, etc.), are in laminated solid form and sandwiched between glass panes or types of protective layers which render mobility in the environment unlikely.

The disposal of solar facility components is governed by the Federal Resource Conservation and Recovery Act and state-specific waste rules. If waste has the potential to be hazardous, the generator of that waste must determine the presence and quantity of toxic substances through representative sampling and laboratory analysis, or “acceptable knowledge” of the waste. Some items used during construction and operation of the facilities are known hazardous materials (fuels, solvents, herbicides), however, the waste status of the solar panels is not universally recognized and requires more evaluation when disposing of materials.

The eventual disposal of the solar panels, including any crushing or damage to the panels, as well as the potential quantities of panels placed in a landfill, would require additional consideration. The EPA classifies types of hazardous wastes based on one of four characteristics, with “toxicity” the potential type that might apply to solar panels. The toxicity of a waste is determined by the Toxicity Characteristic Leaching Procedure (TCLP). Solar panels may exhibit the hazardous waste characteristic of toxicity due to the presence of heavy metals such as cadmium, copper, lead, or selenium. If testing is done on a panel and it passes the TCLP, it can be treated as general waste, but if it fails the test, it must be disposed of according to federal and state hazardous waste rules. In Wisconsin, solar panels must be evaluated according to state rules on hazardous waste. This may include needing to conduct a TCLP test or using manufacturer documentation of waste determinations along with Safety Data Sheets (SDS) information.

There is much discussion on improving the ability to recycle solar panels and other components of a solar generation facility. Increasing the ability to recycle components or whole panels could reduce the potential for these facilities to be sources of increased amounts of hazardous wastes. The Wisconsin DNR is currently in the process of reviewing current state and federal regulation to develop guidance regarding the disposal needs for solar projects at the end of life.

BESS

The lithium-ion batteries that would make up the BESS are similar to those that are used in many common household applications such as cell phones, tablets, and hearing aids. When they are contained in the cell, they are considered to be safe to use. However, the cells contain reactive chemicals that, if released in uncontrolled situations, can produce hazards. The electrolyte solution found within a battery cell has corrosive properties that can cause burns, respiratory irritation, and is highly flammable. Many items that are manufactured to a certain shape or design and do not result in exposure to hazardous chemicals during normal operation are considered “manufactured articles” by the Occupational Safety and Health Administration (OSHA) and are not subject to Hazard Communication Standards. However, in 2015, OSHA determined that similar to lead acid batteries, although lithium-ion batteries are sealed, they have the potential to leak, spill, or break during normal conditions of use and foreseeable emergencies, causing exposure to chemicals. As a result, an owner/operator of a BESS must have a materials safety data sheet (MSDS) for the lithium-ion batteries used, and that MSDS should not state that the batteries are considered “manufactured articles”.

The applicant states that the BESS would use a fire suppression system that includes use of Stat-X or a similar chemical agent. The MSDS for Stat-X states that exposure to the aerosol agent may cause temporary mild irritation of mucous membranes. The MSDS also states that Stat-X does not contain dangerous materials as defined by ordinance on hazardous materials.

3.9.2. Solid Waste

Solid wastes would be generated during the construction of this project and would need to be removed to appropriate waste disposal or treatment facilities. Examples of the types of wastes expected to be generated include scrap steel and other metals, sanitary waste, scrap plastics and wood, and other items used by construction staff. During construction, stacks of rejected support pilings have been seen at some utility scale solar facilities in Wisconsin. Pre-drilling holes prior to driving piles may decrease pile rejection and waste metal. At the end of construction, items such as silt fences, stakes, and any non-biodegradable waste should be fully removed from the site when no longer needed.

During project operation, there may be damage to project components that would generate waste. Damaged or defective items not able to be repaired would need to be removed to appropriate waste disposal facilities. This would likely include defective or broken electrical materials (including solar panels), empty containers and other miscellaneous solid wastes. The applicant should ensure waste materials are separated and recycled as much as possible and promptly remove all waste during both construction and operational phases to reduce safety and aesthetic impacts. During site decommissioning, project components would be examined, including for functionality, before being removed from the project area. The applicant states that where resale options exist, items would be sold, and any other components would be recycled or disposed of at appropriate facilities.

3.10. Historic Resources

The applicant contracted Commonwealth Heritage Group (Commonwealth) to conduct a review of historic resources within the project study area. To complete this desktop review, Commonwealth used published literature and records to identify known archaeological and cemetery or burial sites within the project area (4,355 acres) as well as parts of the Town of Otsego as part of a 0.25-mile project buffer. The report defined the Area of Potential Effects (APE) for direct effects to archaeological resources as the entire project area, regardless of whether facilities were planned to be constructed. The APE for indirect or visual effects to above-ground architectural historic resources included the 0.25-mile buffer beyond the defined project area.

The review found 14 above-ground architectural historic resources associated with three farmsteads and a barn that were within the APE for indirect or visual effects. None of the properties identified within the APE for indirect effects are listed on the National Register of Historic Places. The historic resource review found three previous archaeological surveys had been done in the project area, and this desktop review found no previously identified archaeological sites within the APE that would be impacted. One historic cemetery was found within the 0.25-mile buffer area of the APE and Commonwealth suggested avoidance of ground disturbing activities within ten feet of the parcel boundary. The applicant states this recommendation has been incorporated into project design and the cemetery is not anticipated to be impacted.

Archaeological site-location modeling was used to identify areas of high potential for archaeological sites using a range of environmental variables. The applicant has provided the results of an archaeological field survey within the planned project disturbance areas that were identified as having a high probability for unidentified prehistoric archaeological resources. No archaeological resources were identified during the survey. The application included an unanticipated archaeological discoveries plan, which states that the WHS would be contacted in cases where artifacts or human remains were inadvertently discovered during construction of the project.

3.11. Invasive Species and Disease Organisms

Invasive plants and other organisms can have negative impacts on ecological systems and be challenging to control or remove once established. Construction of the project may cause the spread and establishment of non-native invasive species. Construction equipment traveling from infested to non-infested areas could spread noxious or invasive weed seeds and propagules. The removal of existing vegetation during construction could create open areas of soil, which invasive plants often invade and persist in after disturbance. Although many areas of the proposed project area are currently in row crop agricultural production, where such weeds are typically controlled by physical actions or herbicide treatments, existing seedbanks may allow for new populations to establish in areas of disturbed soils where continuing control does not occur.

Areas with established populations of invasive plants can include field edges, road ROWs, wetlands and waterways, and potentially fallow fields or areas not in active management.

Detailed information on Wisconsin's invasive species rule, Wis. Admin. Code ch. NR40 (NR 40) is found on the DNR's website, including current lists of regulated species.

As part of the preparation of the ground cover strategy, RES ecologists completed a windshield survey of invasive species in the project area in March, 2022. Most plants are still dormant and identification of species is difficult in early spring. In addition, invasive or weedy plants that might be present in fields that were harvested are unlikely to be observed. Some weedy or invasive species were identified in the project area, as expected with field edges and road ditches near agricultural and residential areas. Additional invasive plants were recorded during wetland delineations in the project areas. No prohibited species under NR 40 were identified in the plant surveys. The following restricted invasive species were identified during project surveys:

- Wild parsnip (*Pastinaca sativa*)
- Teasel species (*Dipsacus* spp.)
- Common Buckthorn (*Rhamnus cathartica*)
- Bush honeysuckles (*Lonicera* spp.)
- Cattail species (*Typha* spp.)
- Canada thistle (*Cirsium arvense*)
- Garlic mustard (*Alliaria petiolate*)

The project also had the following weedy/invasive species that are not regulated by NR40:

- Reed canary grass (*Phalaris arundinacea*)
- Sweet clovers (*Melilotus* spp.)
- Burdock (*Arctium minus*)
- Velvetleaf (*Abutilon theophrasti*)

In addition to the above list, there are likely to be other invasive species found in the project area. The applicant or its contractor should conduct plant surveys as final construction plans are being prepared to gain an understanding of where invasive species are located. Knowing where these species are located would allow for the evaluation and use of appropriate BMPs to prevent construction activities introducing or spreading invasive species to other areas of the project or nearby properties. In addition to invasive plants, the project area has several forest pests that could be spread if BMPs¹⁹ are not followed. These forest pests include emerald ash borer, heterobasidion root disease, oak wilt, and spongy moth (*Lymantria dispar*).

A critical element of invasive species management is the ongoing monitoring plan for a site. Staff that access the site should be trained to look for early establishing invasive species and have a process for mapping and reporting new populations for control treatment. The plan and list of species should be adaptive, and able to address new invasive species that might be found in the project area. The applicant has a preliminary discussion of these actions in the Vegetation Management Strategy developed for the project (Appendix K²⁰ of the application). Some actions described in this document include periodic inspections of establishing and established

¹⁹ These BMPs can be found on the DNR's Forest Health: Promoting Healthy Wisconsin Forests webpage. Accessed online at: dnr.wisconsin.gov/topic/ForestHealth.

²⁰ PSC REF#: 442075.

vegetation to detect native and non-native invasive species issues and using spot herbicide treatments to prevent invasive species propagation as needed before, during, and after construction. Mowing would be done to prevent invasive species from flowering or setting seed, and the mowing equipment would be cleaned on site to prevent spreading seeds or propagules.

3.12. Local Government

3.12.1. Land Use Plans

The applicant provided a current Columbia County Zoning map as Appendix A – Figure 4.1.8.1 of the application²¹. Most of the project area planned for construction of solar facilities is classified by Columbia County Zoning as “Agriculture” (A-1), “General Agriculture” (A-2), and “Agricultural Overlay” (A-4). Other parcels in the project area, not hosting project facilities, are zoned for “Rural Residence” (RR-1), “Single-family Residence” (R-1), or “Recreation” (RC-1). The future land use plans for the project area show that most of the area is planned for “Agricultural or Other Open Space”, “Recreational”, with overlays of “Environmental Corridors”.

Utility use is a “Permitted Use” under Wis. Stat. ch. 91 (Farmland Preservation) where the facility is “authorized to be located in a specific place under a state or federal law that preempts the requirement of a conditional use permit for that use.” In a situation where a project CPCN is approved, Wis. Stat. § 196.491(3)(i) says: “If installation or utilization of a facility for which a certificate of convenience and necessity has been granted is precluded or inhibited by a local ordinance, the installation and utilization of the facility may nevertheless proceed.”

Utility use on land zoned as Farmland Preservation is stated in Wis. Stat. § ch. 91 as a conditional use if the political subdivision finds that the following applies:

- a. The use and its location in the farmland preservation zoning district are consistent with the purposes of the farmland preservation zoning district.
- b. The use and its location in the farmland preservation zoning district are reasonable and appropriate, considering alternative locations, or are specifically approved under state or federal law.
- c. The use is reasonably designed to minimize conversion of land, at and around the site of the use, from agricultural use or open space use.
- d. The use does not substantially impair or limit the current or future agricultural use of surrounding parcels of land that are zoned for or legally restricted to agricultural use.
- e. Construction damage to land remaining in agricultural use is minimized and repaired, to the extent feasible.

As currently proposed, the fenced solar arrays, project substation, BESS, interconnection switchyard, and O&M building would not be in agricultural use while the project is operational, which does not appear to be in keeping with the goal of using those acres as active farmland.

²¹ PSC REF#: 442040.

The applicant described how planned construction and siting of the project would limit impacts to agricultural use of surrounding parcels and construction damage to land remaining in agricultural use. The applicant may negotiate with landowners to allow leased areas of parcels that do not have solar facilities to continue being used for agricultural production. Other potential use of the project parcels may include vegetative buffers, native seed production, and pollinator habitat. If the applicant decided to allow the use of grazing sheep around the solar panels the land would retain a more agricultural land use. The land could also be returned to agricultural use after the decommissioning of the solar farm.

Before the CPCN can be issued, the Commission under Wis. Stat. § 196.491(3)(d)6 must determine that: “The proposed facility will not unreasonably interfere with the orderly land use and development plans of the area involved.” This last section of the CPCN statute indicates that the Commission must be aware of potential conflicts with existing local ordinances, zoning or land use plans and determine whether they are reasonable when making its final decisions about the project.

3.12.2. Shared Revenue

A solar electric generation facility is considered tax-exempt utility property in Wisconsin. The loss of property taxes from the land taken up by the proposed generation facilities could be a negative impact to any hosting municipalities and counties. However, the project owners pay into the Wisconsin Department of Revenue’s Shared Revenue Utility Aid Program that distributes annual funds to communities hosting an electric generating facility. If the proposed project is approved, Columbia County and each of the municipalities hosting project facilities would receive shared revenue payments. Qualifying utility property includes electric substations, general structures such as office buildings, and power production plants. The amount of funds allocated to each municipality is based on the nameplate capacity of the facility and the number of residents in their respective jurisdictions. This shared revenue program would only apply to those municipalities directly hosting project facilities.

Under Wis. Stat. 79.04, local municipalities are paid annually for generation that is located within their boundaries. Since 2009, payments for power plants have been calculated under a formula where the combined municipal and county payments for the plant are equal to \$2,000 multiplied by the plant's production capacity, measured in megawatts. A per capita limit is placed on the payments determined by the distribution formulas. Aid on substations and general structures is computed by applying a mill rate to the net book value of the qualifying utility property and depends on the type of municipality where the qualifying property is located. The municipalities and counties that host solar facilities also qualify for an incentive payment under Wis. Stat. 79.04(7)(c)1, which applies to power plants that derive energy from an alternative energy resource. This incentive payment would be an amount that is equal to the number of megawatts that represents the power plant’s name plate capacity multiplied by \$1,000 each to the county and municipalities. If an area has not met its per capita cap, the total state payment for a solar energy generation plant is \$4,000 per megawatt.

The applicant provided an estimate of local revenue impacts and other economic evaluations in an Economic Impact Report, filed as Appendix X of the application. This report calculates that Columbia County would receive over \$700,000 annually and the combined townships would

receive over \$500,000 annually under the current Utility Shared Revenue Formula, divided out based on the amount of facilities hosted.

In addition to the shared revenue for the solar energy generation facility, an annual impact fee of 0.3 percent of the total cost of the gen-tie line and a one-time environmental impact fee in an amount equal to five percent of the gen-tie line cost would be paid to the Department of Administration pursuant to Wis. Stat. § 196.491(3g) and Wis. Admin. Code Ch. Adm 46. The total cost of the gen-tie line is not currently known and would depend on route, final engineering, and construction timing. Fifty percent of the fee paid would be distributed to Columbia County and fifty percent would be distributed to the Towns of Arlington and Leeds in proportion to the allocations determined by the Commission.

3.13. Local Infrastructure

3.13.1. Airports and Air Traffic

The applicant conducted a search ten miles out from the project area for public and private airports, landing strips, and helipads. This review found that there would be one public and twelve private airports, all with turf runways. The nearest runway would be approximately one mile south of Array F. The applicant reviewed DATCP's interactive map of the spongy moth aerial spray program, which shows there are no planned treatment areas in Columbia County. Through discussions with local landowners, the applicant determined that there are limited annual aerial fungicide applications in the project area.

The solar arrays are not anticipated to physically impact air traffic due to the limited height of the panels, expected to be 15 feet at the highest point, and the distance of the facilities to airports in the project area. The applicant did not evaluate the potential for glint or glare to impact airports. The FAA has a technical guidance document that describes three methods to evaluate the potential for a solar PV project to cause glare to pilots or traffic controllers in a tower on an airport. This document states that even with the anti-reflective coating, the panels can cause glare depending on the angle of the panel compared to the sun and viewer. The Interim Policy FAA Review of Solar Energy System Projects on Federally Obligated Airports (78 FR 63276) states: "Solar energy systems located on an airport that is not federally-obligated or located outside the property of a federally-obligated airport are not subject to this policy. Proponents of solar energy systems located off-airport property or on non-federally-obligated airports are strongly encouraged to consider the requirements of this policy when siting such systems." With none of the local airports having air traffic control towers or experiencing large amounts of air traffic, impacts are not anticipated to be significant.

The nearest airport to the gen-tie line would be approximately 2.7 miles southeast. The structures for the gen-tie line are estimated to be between 80 and 135 feet in height for most structures, with the dead-end or corner structures between 90 and 150 feet in height. Project development would not trigger the need for WisDOT high structure permits. The applicant states that the FAA's Notice Criteria Tool indicates that notice may be required, but the applicant does not anticipate that alterations to the gen-tie line design would be necessary.

3.13.2. Communication Facilities

The applicant employed a contractor (Comsearch, Inc.) to perform a search of the project area and provide documentation of communications towers, structures, and communications equipment adjacent to the proposed solar facilities. Comsearch analyzed the locations of these facilities to determine whether the project was likely to impact any mobile phone operations, radio broadcast stations, Over-the-Air (OTA) TV reception, Doppler radar, and emergency services communications. Appendix L²² of the application provides the results of these searches and a description of the potential for the project to interfere with existing communication infrastructure. The project is not expected to cause impacts to microwave bands used for telecommunications or cellular phone towers due to the limited height of the solar panels. The location of the solar arrays meets or exceeds the required distance separation from all licensed AM and FM broadcast stations near the project area and no impacts are anticipated. The report recommends the inverters should be installed at a minimum setback distance of 500 feet from any household to avoid impacts to OTA TV reception, but generally, no impacts are anticipated.

The proposed project is not expected to cause any significant impacts to emergency services communication systems. The height of the panels is not expected to be greater than 15 feet, which is substantially lower than the towers used by these communication systems. As the communication system user is likely capable of receiving signals from multiple transmitter locations and the operational frequencies for these services have characteristics that allow the signal to propagate over and through the solar panels no impacts due to the solar facilities is predicted. Studies of potential impacts to radar systems showed the project is not expected to cause any impacts to these systems.

3.13.3. Railroads

Most of the proposed project is not near railroads, with the exception of the gen-tie line and interconnection switchyard. The two gen-tie line route options join to a common segment just prior to crossing the Soo Line Railroad west of USH 51. The gen-tie line would not run parallel to the railroad but would cross it perpendicularly. The applicant has conducted initial outreach to Soo Line Railroad to negotiate a crossing agreement for the gen-tie line at a perpendicular angle with sufficient clearance as to not interfere with railway operations. The applicant states it would work with Soo Line Railroad to ensure that there are minimal impacts to railroad operation during construction.

The proposed interconnection switchyard is approximately 115 feet from the railroad at the closest point. Facilities in the switchyard such as the 345 kV transformers can produce a certain amount of EMF, which can project magnetic fields and induce voltages in nearby metal equipment. However, at the distance the proposed switchyard is from the railroad, induced voltage is not anticipated to cause impacts to the railroad.

²² PSC REF#: 442048.

3.13.4. Roads and Traffic

There would be increased impacts to local roads and traffic during the construction of the project as workers arrive and leave the site, deliveries are made, and any large machinery travels to or within the project area. The applicant provided a description of the probable delivery routes²³ and potential for road damage in Section 3.3 of the application. Main delivery routes include USH 51, STH 60 and CTR 22, with the main laydown yard located on CTR 22. Haul routes would be signed by the applicant. The applicant estimates that between 25 and 35 daily deliveries of materials using road legal trucks. The applicant does not anticipate using vehicles that are larger than standard flatbed and box trucks for deliveries, apart from oversize/overweight vehicles needed for the delivery of the main step-up transformer for the project substation and grading machines. Delivery vehicle(s) for gen-tie line pole structures and cranes used for offloading activities may also require oversize/overweight vehicle permit(s) depending on equipment specifications. The construction contractor would be tasked with obtaining any oversize-overweight permits closer to delivery dates. Some roads in the project area may be subject to seasonal weight limits, even for road legal trucks and machinery.

Access roads for the project would connect to several state or county highways, and many local roads in the project area. Any driveways onto state highways would need permits from WisDOT. The applicant should ensure that appropriate aggregate tracking pads are located on access roads to reduce the amounts of soils deposited onto roads when vehicles exit a construction area. Road cleaning equipment may be necessary if mud or soils are tracked onto roads.

The applicant does not anticipate substantial modifications of roads in the project area prior to construction. There could be some damage to local roads during the construction phase of the project. The applicant is negotiating several topics relating road use and repair in the local agreements with the affected local governments. The example local agreement provided by the applicant as Appendix W²⁴ describes potential actions by the applicant to evaluate road conditions prior to and after construction and how to address road damage. The applicant may provide an agreed upon financial sum to the local municipality or county in lieu of conducting road repairs.

During construction, the volume of traffic in the project area would increase due to increased truck use and influxes of construction staff. The applicant states that it would develop and review a traffic control plan with Town, County, or WisDOT officials as appropriate prior to deliveries beginning to the area. As site conditions allow, deliveries would occur at the point where equipment or supplies would be used to minimize the amount of truck use through the area. Trucks would not be allowed block public roads and if needed would be directed to a designated staging area. Deliveries would be expected throughout the project construction timeline, with most of the construction equipment arriving during the mobilization phase, aggregate and other road material early in the site development phase, and equipment deliveries throughout the installation process. Most deliveries would occur during daylight hours, with some construction staff traffic in the area prior to or after daylight hours.

²³ Appendix 3.3.4.2 Haul Routes Map – PSC REF#: 442023.

²⁴ See PSC REF#: 442078.

The applicant provided the setback distances used during project development as Table 1.5.3.1 of the application. Table 6 shows the setback distances from solar panels and array fences²⁵ to different types of roads in the project area.

Table 6 - Setback distances from project facilities to roads.

| Feature | Distance to solar panels | Distance to array fences |
|----------------------------|---|---|
| Federal and State highways | 50 feet from ROW or 110 feet from centerline. | Outside of ROW, anticipate at least 8 feet between fence line and ROW edge. |
| County trunk highways | 42 feet from ROW or 75 feet from centerline. | Outside of ROW, anticipate at least 8 feet between fence line and ROW edge. |
| All other roads | 30 feet from ROW or 63 feet from centerline. | Outside of ROW, anticipate at least 8 feet between fence line and ROW edge. |

3.14. Local Jobs

The construction of solar energy projects requires a range of different staff, and the numbers of those workers would vary during the construction process. The construction workforce would include equipment operators, craft workers, delivery drivers, laborers, electricians, project managers, and monitoring and compliance staff. During site mobilization and during the first phases of construction, there would be fewer workers on site compared to during the phase of racking and module installation. The project contractors may use a traveling workforce as observed on other solar projects to date. Communities near the project area are expected to have some short-term positive economic impacts during the construction phase as employees use various local businesses for food, lodging, supplies, and fuel.

The applicant included an Economic Impact and Land Use Analysis prepared by a consultant as Appendix X²⁶ of the application. This analysis used a Jobs and Economic Development Impact (JEDI) model²⁷ to estimate numbers of jobs not only at the solar project but also at a wider scale through local revenues and supply chains. The use of the JEDI model estimated jobs directly related to construction would be 29 for Columbia County and 341 for the State of Wisconsin. The model estimates that indirect and induced impact jobs would be 165 for Columbia County and 375 for the State of Wisconsin. In total, the JEDI model estimates 194 jobs created in Columbia County and 716 in the State of Wisconsin as a result of the construction of High Noon Solar. As with all input-output models, the accuracy of the results derived from use of the JEDI model are dependent on many parameters that affect relationships between economic expenditures and the outcomes predicted. In the response to data request PSCW-STC-2.4, the applicant states that it anticipates hiring up to 600 workers to assist in project construction. These positions would vary in hours and duration, and at this point, the applicant is not able to estimate the number of local (Columbia County) or state workers that would be hired. Such information would be known closer to the time of construction. The applicants state the during

²⁵ The response to data request ACI 1.12 (PSC REF#: 445661) provided additional clarification on the setback distances from array fence lines to roads.

²⁶ PSC REF#: 442090.

²⁷ The JEDI model used was developed and is supported by the National Renewable Energy Laboratory (NREL).

the operational life of the project, up to five full-time employees would work and reside locally in Columbia or Dane Counties.

During the EA scoping period, the Wisconsin Laborers District Council provided a comment that discussed the difference in benefits between workforces hired in-state and those from out-of-state, and requested several types of analyses as part of the EA, including economic benefits and workforce availability. These types of analyses are generally outside the scope of an EA for this type of project, although more discussion of this issue is provided here. Commission staff are aware of an October 2021 report²⁸ produced by Forward Analytics that discusses the differences in local economic benefits of using local workers versus an out-of-state workforce. One conclusion from that report stated that using a local workforce creates between 73 percent and 158 percent more economic activity than using out-of-state workers. The Solar Energy Industries Association conducts a Solar Census²⁹, and the most recent one, with data into 2020, indicates that Wisconsin has approximately 3,000 solar employees in-state.

3.15. Noise and Sound

Noise is unwanted sound considered unpleasant, loud, or disruptive to hearing. Noise is measured in units of decibels (dB) on a logarithmic scale. Because the human ear is not equally sensitive to sounds throughout the range of hearing frequencies, a weighted scale is commonly used, with the A weighted scale (dBA) most often used for sound measurements affecting human hearing. Due to the logarithmic scale of sound measurements, a change of 3 dBA is considered barely perceptible, while a change of 10 dBA is perceived as a doubling/halving of noise. For reference, the sound level of normal breathing is about 10 dBA, normal conversation at three feet is about 60 dBA, and emergency vehicle sirens are about 115 dBA.

Impacts associated with noise can be subjective and vary from person to person, based on factors such as loudness, time of day, frequency, or duration, and the amount of other background noise audible to the listener. Most noise impacts caused by the project would occur during the construction phase due to the use of heavy machinery and particularly, use of pile drivers. Noise levels during operation of the solar facilities are expected to be less than construction. During operation of the project the primary sources of noise would be inverters, transformers, HVAC cooling systems associated with the BESS, the substation transformers, and at close proximity, the rotation of the tracking systems. Because the solar project would not be generating electricity at night, it is anticipated that the tracking systems and inverters would be silent during typical operations. Noise from substation transformers and BESS systems would be anticipated during nighttime hours.

3.15.1. Standards for Noise Levels

There are no statewide noise standards for solar electric generation facilities in Wisconsin. Most counties and municipalities do not have specific solar facility or BESS noise standards. The

²⁸ Dale Knapp. Oct 2021. Capturing the Sun – The Economic Benefits of Using Local Workers on Wisconsin Solar Projects. This report was produced for Wisconsin Infrastructure Investment Now (WIIN) and is available on their website.

²⁹ SEIA et.al. May 2021. 11th Annual National Solar Jobs Census 2020.

Columbia County Zoning Ordinance has noise limits that apply to a wind energy system that are consistent with Wis. Admin. Code PSC 128, specifically, not to exceed 50 dBA during daytime hours and 45 dBA during nighttime hours. Most solar developers to date, including the applicant, have set a goal of keeping noise levels consistent with these levels. Columbia County also has an ordinance regulating the construction of mobile service support structures, which states “noise producing construction activities shall take place only on weekdays (Monday through Saturday, non-holiday) between the hours of 6:00 am and 6:00 pm, except in times of emergency repair.” There is not a local town or county ordinance that regulates construction activity time of day for a solar electric generation facility, or just general construction, as far as Commission staff are aware.

3.15.2. Pre-construction Phase

The applicant commissioned Hankard Environmental, Inc. (Hankard) to conduct a pre-construction noise analysis³⁰ of the project area. This pre-construction noise analysis determined the location of all noise-sensitive receptors located near the project, measured existing noise levels within the project study area, and predicted both construction and operational noise levels at noise-sensitive receptors. The analysis was done according to the PSC’s Measurement Protocol for Sound and Vibration Assessment of Proposed and Existing Electric Power Plants (November 2008). As part of this noise analysis, staff from Hankard conducted an ambient noise survey during November and December of 2021 to measure existing noise sources and levels. Measurement points were presented to Commission staff prior to the study for comment and approval. The most common noise sources observed were traffic, wind, birds, agricultural equipment, aircraft overhead, and dogs barking. The observed ambient noise levels ranged from 31 to 59 dBA during the day. Long-term noise measurements in the area recorded nighttime noise levels as low as 20 dBA and the highest daytime noise level of 71 dBA.

Once representative ambient noise levels were obtained, and Hankard was given a range of assumptions regarding project components, the noise levels associated with those components, and some assumptions regarding noise reduction measures that would be incorporated into the project design, Hankard selected 202 noise-sensitive receptor locations, corresponding to participating and non-participating residences in the project area³¹ as well as three cemeteries and a shooting range. The model used a ground factor of 0.5 to represent a ground surface that is planted with grasses, and midway between completely reflective (ground factor of 0.0) and very absorptive surfaces such as thick grass or fresh snow (ground factor of 1.0).

Noise levels were predicted for the receptor locations and ranged from 16 to 41 dBA during daytime hours with the BESS operating at maximum capacity. Anticipated noise levels at the receptor locations for nighttime hours, when the solar inverters would not be operating, but the BESS is operating, ranged from 15 dBA to 38 dBA. Hankard predicted that all noise levels would be less than the daytime noise standard of 50 dBA and nighttime noise standard of 45 dBA required for wind energy projects and selected as an operational noise goal by the applicant. The report describes some assumptions made, including that noise mitigation actions such as

³⁰ Provided as Appendix J of the application: PSC REF#: 442047.

³¹ Residences within one-half mile of any solar inverter or the project substation/BESS area.

constructing a wall or other barrier around the BESS and project substation may be necessary to meet the predicted noise levels. Other potential noise mitigation actions could include requiring quieter equipment, relocating equipment, or installing noise mufflers on specific pieces of equipment. Hankard suggests that as the applicant finalizes the design of the project and selects specific types of equipment, that the noise analysis be updated to determine if the selected noise limits are still anticipated to be met.

3.15.3. Construction Phase

Construction noise would come from a series of intermittent sources, most of which would be diesel engine construction equipment. Because of the unique nature of large-scale solar projects, construction, and its associated noise, would be spread over a large area. Construction noise impacts would vary significantly with time of day, stage of construction, and the location of work. Construction would occur primarily during daytime hours, so there should be little or no construction noise impact at night. Pile driving work would likely be the most impactful source of construction noise and vibration. During pile driving activities, the regularly spaced noises for the length of time of construction may be disruptive and annoying for nearby residents. TABLE 7 shows some of the typical noise levels at 50 feet for commonly used construction equipment.

Table 7- Average Maximum Noise Levels from Common Construction Equipment.³²

| Equipment | Noise level at 50 feet (dBA) |
|----------------|------------------------------|
| Backhoe | 84 |
| Dozer | 86 |
| Grader | 79 |
| Excavator | 87 |
| Flat Bed Truck | 74 |
| Pile Driver | 105 |
| Crane | 79 |
| Roller | 82 |

The noise analysis conducted by Hankard also estimated the noise during construction for four different stages: site preparation, civil work (grading), mechanical assembly, and electrical assembly. This analysis found that the nearest residences to the project construction could experience noise levels as high as 74 dBA during site clearing and grading. These noise levels could increase during the mechanical assembly phase due to the use of pile drivers and could reach 77 dBA when construction is closest to a residence. These noise levels are not anticipated for the duration of construction, as the noise levels would decrease as machinery moves away

³² Sound levels taken from Washington State DOT Biological Assessment Training Manual, updated August 2020. Accessed at: wsdot.wa.gov/sites/default/files/2021-10/Env-FW-BA_ManualCH07.pdf on October 12, 2022.

from residences. At this time, the applicant does not anticipate construction of project facilities to regularly occur at night. Constructing the project predominately during the day would decrease noise impacts to nearby residences. Another way to mitigate noise impacts during construction is to ensure that diesel engine mufflers on machinery or equipment are kept in good working order.

3.15.4. Post-construction Operational Phase

In previous electric generation facility projects, the Commission has typically required that a post-construction noise survey be prepared as a condition of approval of the project. If the project is approved, the applicant will be required by the Commission's order to collect post-construction noise measurements in accordance with the PSC Noise Protocol. These measurements are taken at the same places and during the same time periods as the pre-construction measurements. Two sets of measurements are required: one with the project facilities in operation, and one where the project facilities would not be operating. This post-construction study could identify any areas where actual sound levels were greater than predicted and higher than permitted levels. Any areas where actual sound levels are higher than predicted and may exceed what was stated in the application may need noise mitigation actions, such as noise wall construction, installation of vegetation buffers, or alterations to the project equipment (noise suppressors).

During the operational life of the project, there may be variations in noise observed by nearby residents. The applicant states that it would meet with any local resident submitting a noise complaint in order to understand the nature of the noise complaint. A resident observing higher noise levels may be an indication that there is damage to or malfunctioning equipment. The applicant states that it would determine if the noise is the result of a mechanical issue that can be repaired, and if not, would attempt to reach a mutually agreeable solution with the resident. Commission staff observations of operating solar facilities in Wisconsin indicate that noise is not a significant impact under normal conditions. No large-scale BESS has been placed into operation as of the date of this EA to allow for similar observations.

3.16. Participating and Non-participating Landowners

3.16.1. Landowner Agreements

The proposed project would be constructed on land that is leased, or in some cases, purchased, from participating landowners. These solar projects often have a solar option or lease agreement for an entire parcel, although only part of a parcel may eventually host solar facilities. Additional leases and easements are negotiated with landowners for the ability to cross property with collector circuits, access roads, or gen-tie lines. The land necessary for a project substation or BESS is often purchased rather than leased. The amount of land under lease agreements is usually larger than the stated land necessary to support the final project. A landowner leasing property to the project typically would not have access to the land within arrays while the project is in operation. Some landowner access to perimeter areas may be negotiated in the lease agreements. Currently, twenty landowners have signed contracts to host solar arrays, nine landowners have signed contracts to host collector circuits, two landowners have signed contracts to host the gen-tie line (one of which is also hosting collector circuits), and there is a

purchase option from one landowner for the location of the BESS, project substation, and O&M building.

Some renewable energy projects offer “good neighbor agreements” to nearby non-participating residences. These typically include payments to mitigate some of the impacts that affect nonparticipating properties. Some good neighbor agreements may contain actions that the developer agrees to conduct, such as planting screening vegetation or adjusting the placement of fences. The applicant states it has begun a “Good Neighbor Program” but no good neighbor agreements have been executed to date. The applicant states that it would make offers of good neighbor agreements to landowners of residential property immediately adjacent to any proposed and/or alternative arrays and would negotiate such agreements in good faith.

3.16.2. Nearby Residences

In previous Commission dockets for solar generation facilities, as well as in this docket, non-participating landowners adjacent to the project have voiced concerns regarding the proximity of arrays and fences to their property. Concerns raised include the aesthetic impacts from facilities, particularly when panels would be on multiple sides of a property, the potential for noise or glare, limits to wildlife use of the areas occupied by the arrays, and potential impacts to property value. The applicant provided the numbers of participating and non-participating residences located within 300 feet of array fence lines in Appendix O - PSC Solar Impact Tables³³. Table 8 shows the numbers of non-participating residences and Table 9 shows the numbers of participating residences located at various distances from the proposed and alternative arrays.

Table 8 Distances of non-participating residences from proposed and alternative arrays.

| Non-participating landowners | Distance from arrays | Proposed Arrays | Alternative Arrays |
|---------------------------------|----------------------------------|-----------------|--------------------|
| | 0-25 feet | 0 | 0 |
| | 26-50 feet | 0 | 0 |
| | 51-100 feet | 0 | 2 |
| | 101-150 feet | 5 | 19 |
| | 151-300 feet | 9 | 9 |
| | Total residences within 300 feet | 14 | 30 |

³³ PSC REF#: 442062.

Table 9 Distances of participating residences from proposed and alternative arrays.

| Participating landowners | Distance from arrays | Proposed Arrays | Alternative Arrays |
|--------------------------|----------------------------------|-----------------|--------------------|
| | 0-25 feet | 0 | 0 |
| | 26-50 feet | 0 | 0 |
| | 51-100 feet | 0 | 1 |
| | 101-150 feet | 0 | 0 |
| | 151-300 feet | 3 | 4 |
| | Total residences within 300 feet | 3 | 5 |

The applicant provided the minimum setback distances to various features chosen by the developer in the development of the project as Table 1.5.3.1 of the application. An excerpt of that information is provided in Table 10 below.

Table 10 – Developer selected minimum setback distances from various features.

| Feature | Distance to solar panels | Distance to array fences |
|----------------------------------|--------------------------|--------------------------|
| Residences | 100 feet | 18 feet |
| Non-participating property lines | 28 feet | 8 feet |
| Other buildings | 28 feet | 8 feet |

The applicant states that minimum setback distances were chosen to ensure safe construction, maintenance, and operation of the proposed project taking into consideration landowner rights, local zoning ordinances, avoidance of impacts on sensitive environmental and infrastructure features, and the characteristics of these types of projects.

3.16.3. Other Existing Easements

Existing infrastructure such as high voltage transmission lines, natural gas pipelines, and telecommunications infrastructure may already be located on properties that are now leasing land for the solar facilities. These existing easements may have restrictions on the type of infrastructure that can be constructed in existing ROW and/or restrictions on construction or operational activities in existing ROWs or near existing facilities. The project area has two interstate natural gas pipelines (Northern Natural Gas and ANR) that have north/south orientations. Project infrastructure such as the gen-tie line and collector circuits would cross these pipelines and the applicant would need to coordinate actions with the respective pipelines. Proposed Array E and Alternative Array C would be immediately adjacent to an existing 69-kV transmission line with a north/south orientation.

Conservation easements can also be located on rural properties such as forests, wetlands, or certain agricultural lands set aside for conservation practices. These easements may have different restrictions on what can be done to the vegetation, soils, or any facilities placed on the

property. The applicant is not aware of any participating properties with conservation easements that would be impacted by the project.

3.16.4. Property Values

Some residents near proposed large solar PV facilities, including this project, have expressed concerns that construction and operation of the project would reduce their property values. The public comments anticipate a lowering of property values due to changes in aesthetics, usually described as a view from a porch or residence, changes to a property's rural character, potential impacts from damaged panels after a storm, and the potential for an increase in impacts from noise, light, or glare.

Property values can be influenced by a complex interaction of factors specific to individual parcels of land. These factors can include, but are not limited to, the condition of a property including improvements, acreage, or neighborhood characteristics, as well as proximity to schools, parks, and other amenities. In addition, local and national market conditions can influence property values. The presence of a utility-scale solar facility in the area would become one of many interacting factors that could affect a property's value.

Solar generating facilities have the potential to impact property values. Negative effects from these facilities could be the result of impacts that extend beyond the immediate footprint of the arrays such as noise and visual impacts. However, unlike fossil-fueled electric generating facilities, a solar facility would not produce air emissions during operation of the facility. The installation of solar arrays would create a visual impact, but generally, the panels lack the height of smokestacks or wind turbines and are not typically visible at longer distances. The visual impact is greatest at short distances at ground level and depending on the distance, layout, and acreage of the array in relation to the viewer, may be extensive, or may be very minor. Features such as screening vegetation can soften or mitigate visual impacts.

Some landowners may not like the change in the area from agricultural land use; however, other landowners may prefer the solar project to other land uses, such as row crop agriculture, housing developments, or industrial buildings. On a long-term basis, improper or incomplete decommissioning of a project could adversely affect local property values. The income to the local municipality or county from the Shared Revenue payments may provide benefits to local services that could positively impact a property's value.

Published literature specifically aimed at quantifying impacts to property values based solely on proximity to utility-scale PV facilities is limited. A review of peer-reviewed literature found no research specifically aimed at quantifying impacts to property values based solely on proximity to utility-scale PV facilities. As the industry continues to develop, comparable data should become available. For these reasons, the impact to the value of one particular property based solely on its proximity to a utility-scale PV facility is difficult to determine. In certain situations it is possible that individual property values could be negatively impacted. With the information available, widespread or significant negative impacts to property values are not anticipated.

3.17. Photovoltaic Heat Island Effect

The “heat island effect” is a term used when local air and surface temperatures are higher than nearby natural areas as a result of heat absorbing surfaces at a developed site. This has been observed in urban environments where heat builds up during daytime hours and becomes stored in rooftops and pavement.

There are few studies currently available that investigate whether a similar heat island effect is created from solar generation facilities, referred to in the literature as the photovoltaic heat island effect (PVHI effect). Solar panels could create a PVHI effect by changing the albedo, vegetation, and structure of the area, affecting how incoming energy is reflected back to the atmosphere or absorbed, stored, and reradiated. The published literature on the PHVI effect varies, with some theoretical in nature focusing on simulations and mathematical models, and others utilizing empirical research to measure PVHI. Most of the published research to date has occurred at small-scale solar PV facilities in arid landscapes, dissimilar to the proposed facilities in Wisconsin. Currently there are no known studies that have been conducted at utility-scale (>100MW) solar facilities in the temperate environments of the Upper Midwest.

The most relevant questions applicable to the proposed facilities and this EA include: 1) to what degree could the PVHI effect alter local ambient air temperatures, 2) to what [spatial] extent is this effect occurring, and 3) how this affects the local environment. Observations from recent studies³⁴ show daily and seasonal variation in ambient air temperatures at PV facilities compared to similar sites without PV facilities, spatial dissipation of PVHI, and variations in soil temperatures beneath PV facilities. These results indicate that more information is needed to understand the PVHI effect for utility-scale solar PV facilities constructed in primarily agricultural land in Wisconsin, where soil characteristics and ambient air temperatures influence the productivity of agricultural operations and could have other environmental effects.

The proposed project identifies a minimum distance of 100 feet between panels and non-participating residences with rows of solar panels spaced between 15 and 30 feet apart (panel edge to panel edge). The fenced array areas would be vegetated (unlike most solar facilities in arid landscapes). The spacing and amount of vegetation, among and adjacent to arrays likely influences any PVHI effect as vegetation actively cools ambient air through transpiration. Empirical research is needed to determine the occurrence and spatial extent of any PVHI effect, as well as the potential impacts it could have on local environments at utility-scale (>100MW) solar facilities in temperate landscapes like Wisconsin.

3.18. Public Lands and Recreation

Land occupied by the arrays would be unavailable for hunting or other access by the public or participating landowners. Parks and recreational lands in the project area are not expected to be directly impacted by the proposed project. Although no public lands are within the boundaries of

³⁴ Barron-Gafford, G., Minor, R., Allen, N. Cronin, A.D., Brooks, A.E., and Pavao-Zuckerman, M.A. 2016. The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. *Scientific Reports*, 6, 35070. and Yang, L., Gao, X., Lv, F., Hui, X., Ma, L., and Hou, X. 2017. Study on the local climatic effects of large photovoltaic solar farms in desert areas. *Solar Energy*, 144, 244-253.

the project area, the project is located in between a range of public lands and wildlife areas. The applicant's review of GIS information and discussions with local land managers found there are 4,650 acres of public lands (i.e., conservation easements, county, state, federal, or tribal lands) within two miles of the project area. Information on these resources is shown in Table 11, **including the distance from project facilities, land ownership, and any potential for impacts.**

Table 11 - Public lands and other resources within two miles of the proposed project.

| Property name | Ownership or managed by | Distance to project facilities | Description of potential impact |
|------------------------------------|-------------------------|---|---|
| Schoenberg Marsh | USFWS | <100 feet west of Alt Array K10 and <100 feet south of Alt Array H6 | Project would be immediately east of Schoenberg Marsh on other side of Mielke Road and would be visible to users of the east side of the marsh, including parking area on Mielke Road. May impact wildlife movement to and from property. |
| Mud Lake Wildlife Area | WI DNR | <100 feet north of Array O, Array M1 | Project would be immediately south of Mud Lake Wildlife Area on other side of King Road. Would be visible to users of the area, including parking on King Road. May impact wildlife movement and could introduce invasive or weedy plants to areas of restored or remnant prairies. |
| Empires Prairie State Natural Area | WI DNR | Immediately west of Proposed Array P5 | Project would be immediately east of one part of the Empires Prairie, an area of remnant prairie. Project fences could restrict wildlife movement and there could be introductions of invasive or weedy plants to the area. |
| Columbia County Shooting Range | WI DNR | Approximately 800 feet west of Alt Array P6 | This shooting range is open to the public and owned/managed by the DNR. There are earth berms and a forested area between the targets and the solar arrays. Construction and use of the solar arrays is not anticipated to impact use of the range. |
| Erstad Prairie | Madison Audubon Society | Approximately 1,500 feet southwest of Array K | The project would be just over a half mile from the parking lot for this property, with walking trails closer. The project may be visible in places, but less intrusive than at the previous properties. |
| Fireman's Park | Village of Arlington | Approximately 0.75 miles southwest of Alt Array Q | This multi-use park has baseball diamonds, a play area, and shelters. The project would not be visible due to structures between the park and the arrays or switchyard. |

| Property name | Ownership or managed by | Distance to project facilities | Description of potential impact |
|--------------------------------------|-------------------------|---|---|
| Ankenbrandt Prairie | Madison Audubon Society | Approximately 0.8 miles southwest of Array F | Part of the Goose Pond Sanctuary complex. The project would be northeast of this restored prairie. The parking lot is approximately 1.25 miles away from the project. Due to vegetation and structures between the prairie and solar arrays, any visual impacts would be minimal. |
| Hopkins Road Prairie | Madison Audubon Society | Approximately one mile south of Array F | Part of the Goose Pond Sanctuary complex. The parking lot is approximately 1.3 miles south of Array F. There is a walking trail around the perimeter of the prairie. Due to vegetation and a farm between the site and the panels, visual impacts would be minimal. |
| Rowe Waterfowl Production Area (WPA) | USFWS | Approximately 1.25 miles northwest of Array P | This area of prairie pothole habitat is managed for waterfowl habitat and allows access for visitors. Due to the distance and vegetation and WPA and solar arrays, any visual impacts would be minimal. |
| Sue Ames Prairie | Madison Audubon Society | Approximately 1.3 miles southwest of Array F | Part of the Goose Pond Sanctuary complex. Parking access at Hopkins Road, the prairie has 1.9 miles walking trails. Due to the distance and vegetation and/or structures between the prairie and solar arrays, any visual impacts would be minimal. |
| Lapinski-Kitze Prairie | Madison Audubon Society | Approximately 1.5 miles southwest of Array F | Part of the Goose Pond Sanctuary complex. Due to the distance and vegetation and/or structures between the prairie and solar arrays, any visual impacts would be minimal. |
| Goose Pond | Madison Audubon Society | Approximately 1.8 miles southwest of Array F | This prairie pothole (pond) is a haven for water birds and the nexus of the surrounding sanctuary lands. Access to the pond is limited to avoid impacts to wildlife. The project is unlikely to be visible due to distance and surrounding vegetation or structures. |
| MacKenzie Center | WI DNR | Approximately 1.7 miles northwest of Array L | This 285-acre property is an outdoor educational center with walking trails. The project is unlikely to be visible at any of the center's facilities due to distance and surrounding vegetation or structures. |

Some local snowmobile trails in the project area will potentially be removed and relocated due to the placement of solar arrays. The Arlington Prairie Drifters are the local snowmobile club that maintain snowmobile trails in the project area. One trail passes through the far southern part of Proposed Array F3 and Alternative Array F5 and depending on final design this trail may need to be relocated in this area. Other snowmobile trails on the far eastern side of the project would pass through Alternative Arrays W and X. One trail passes through a small portion of proposed alternative array area Q. If those alternative arrays are used for the project, the trails would need to be relocated. The applicant plans to coordinate with the snowmobile clubs during final engineering to determine the best course of action for re-routing the snowmobile trails (if necessary) during construction and operations.

3.19. Vegetation Management

The applicant provided an initial Vegetation Management Strategy (VMS) as Appendix K³⁵ of the application. This strategy is intended to guide the development of suitable vegetative cover over the project area by describing current conditions, site preparation activities, site establishment actions, and ongoing operational plans. If the project is approved and designs are finalized, the VMS would be used to develop a final Vegetation and Soil Management Plan that incorporates final site layouts, schedules, and other project details.

During the construction phase of the project, vegetation management would include removing any incompatible vegetation on the leased properties prior to site grading and project installation. Most project areas would have been used as agricultural land, with crops removed prior to construction. Areas with invasive or aggressive weeds may be treated with herbicides prior to work. Herbicides can carry over in soil and affect new seedling germination or establishment. The VMS states that selected seed mixes would be evaluated with respect to prior herbicide use on properties and planted when the risk of herbicide carryover has passed.

During operation, solar facilities in the upper Midwest typically have vegetation growing within the arrays, around the site perimeter as well as between and underneath panels. This vegetation decreases the amount of impervious surface associated with the site and assists in managing storm water runoff and soil erosion. Native plant species that can create a healthy and sustainable groundcover on the site are preferred to any noxious or invasive plants. The vegetation needs to be established and managed in a way that avoids conflicts with the operation of the solar generation facility. Solar developers use plants that are not likely to grow tall enough to shade the solar panels or interfere with other equipment. While solar developers have described many sites as ‘pollinator friendly’ most projects planted with native plants that would support pollinating insects only have these species on a small fraction of the overall project area.

The applicant proposed several seed mixes in the VMS, which could be further refined based on seed availability and cost. These seed mixes include:

³⁵ PSC REF#: 442076 (redacted copy), PSC REF#: 442075 (confidential copy). Information on state protected species that could be found in the project area is included in the VMS. This information is sensitive and treated as confidential as per Wis. Stat. § 23.27.

1. Short Stature Grass Sedge Cover Zone – used across most of the solar arrays, intended to allow quick establishment, low height, and ability to treat areas with broadleaf herbicide without impacting the intended vegetation.
2. Pollinator Habitat Zone – would be used in non-array areas due to the height of some species. Native plant species that bloom across seasons would provide some habitat and food sources for pollinator insects. The applicant states that signage would be placed in these areas to inform O&M staff about mowing restrictions.
3. Buffer Zone – intended to be a buffer between array fences and panels, this mix may have low growing forbs added to the Grass Sedge Cover mix.
4. View Screening Zone – intended to be used in areas where visual screening of the project from adjacent properties could reduce impacts. The applicant states that this is unlikely to completely block the appearance of project facilities, but a mix of grasses, sedges, forbs, and some deciduous and evergreen trees and shrubs could reduce visual impacts. As of the application date, no areas are planned to use this planting strategy, but it would be determined through any ongoing discussions with adjacent landowners.

Establishing native grass and forb species would improve soil health over the duration of the project, reduce soil erosion and runoff, and reduce inputs of pesticides into the environment. The applicant states that the vegetation would provide improved ecosystem services compared to the current agricultural row crops. Soil microbes and fungi would respond better to the native plant species planned in the seed mixes and improve soil fertility. The anticipated reduction in nutrients spread switching from modern agricultural systems to the planned grasslands would likely reduce runoff of phosphorus and nitrogen into local water resources.

As discussed in Section 3.11 of this EA, invasive species management is a necessary part of the ongoing vegetation management of a solar facility. Operations and Maintenance staff should be trained to identify populations of invasive plants and begin treatment soon after observation to prevent establishment of these species. Many invasive plant species would grow to heights that could impact the PV panels or equipment. In addition to non-native invasive species, some native vine plants such as wild grape or wild cucumber may need to be removed to avoid damaging solar equipment. Treatment of these invasive or incompatible species could include spot treatment through herbicide, mowing or cutting, or if populations are more established, larger scale applications of specific herbicides or mowing regimes. Cutting or mowing should be timed to prevent seeds from developing and would ideally occur between flowering and seed production. Herbicide applications should be done by trained and licensed applicators³⁶ following the herbicide labels and safety data sheets.

Vegetation management within the arrays would require mowing and weed trimming to keep vegetation from interfering with the panels and other equipment. During the establishment phase (years 1-3) there would likely need to be several cuttings done during the growing season to prevent the establishment and seeding of weedy or invasive species and encourage establishment of the grass/sedge mix. The eventual goal is to arrive at a self-sustaining limited height groundcover that could be mowed only once every year or two. The VMS anticipates that after

³⁶ Individuals should have a current Commercial Pesticide Applicator certification and license issued through DATCP.

vegetation is established and throughout the life of the facility, maintenance would be expected to be an annual mowing, depending on specific conditions. Annual mowing would prevent woody species from getting established and would reduce the risk of wildfire with additional targeted mowings to prevent overgrowth. The time of year any annual (or any supplemental) mowing is done should consider impacts to pollinators, ground nesting birds, the potential for invasive plant seeds to disperse, and ability to remove built up material. For example, the VMS states that mowing of the Pollinator Habitat Zone would occur between October 15 and March 15 to minimize disturbance to ground nesting birds in those areas and to minimize disturbance to peak pollinator movements.

There are areas of remnant and restored prairie near the proposed project. Department of Natural Resources staff reviewed the seed mixes provided by the applicant. Most species in the Grass/Sedge mix would not cause negative impacts to adjacent properties, with the exception of red fescue (*Festuca rubra*), which can be aggressive and outcompete other native grasses and forbs. To reduce the potential for this species to impact the establishment of native grass and forb species both within the project area and grasslands adjacent to the project, DNR staff suggest the removal of red fescue, and avoid inclusion of other fescues or bluegrass species. In addition, DNR staff asked the applicants in email correspondence if they would consider the inclusion of warm-season plantings in the seed mixes used, particularly in locations adjacent to wildlife and State Natural Areas that are currently trying to establish and maintain pre-settlement vegetation. The applicants stated that the Vegetation Management Plan will discuss the additional inclusion of more warm season plantings as well as more native plantings in the mixes.

3.20. Visual and Aesthetic Impacts

3.20.1. Aesthetics

The scenic value, or aesthetics, of any area is a subjective matter and can depend on the values and actions of the viewer. Whether a landowner sees any benefits from the project, directly or indirectly, has been shown to influence attitudes towards aesthetic impacts. Visual impacts of the solar arrays would include changing open agricultural fields to a view of mono-structural, industrial-appearing features across fields. The application information states that the solar panels could be up to 15 feet high at their maximum tilt, depending on the model selected. Topography or vegetation in the project area may obscure parts of the solar installations and decrease the visual impacts on some surrounding areas. Because of their relatively low height, the solar arrays would not be visible at a great distance from the project. Most aesthetic impacts would occur to nearby road users and local residents. Because of the amount of relatively flat open lands associated with the marshes and prairies that make up public land in the area, visual impacts to users of parks or wildlife areas may experience visual impacts, particularly at Schoenberg Marsh along Mielke Road. The applicant provided visual simulations of project facilities at nine locations near the project as Appendix N³⁷ of the application.

³⁷ PSC REF#: 442050.

The most effective way of mitigating aesthetic impacts of solar facilities is likely to be retaining existing vegetation between arrays and residences. If no vegetation exists, creating landscaping plans that use compatible vegetation to block or soften the view from a residence to the arrays may mitigate visual impacts. Avoiding the placement of arrays on all sides of a residence, allowing at least one unimpeded landscape view for a resident, or setting back panels on at least one side to a point where they are at the same level as a tree line, may mitigate aesthetic impacts. The applicant's decision to use "deer fence" or "agricultural fence" as opposed to chain link fence, potentially with barbed wire, decreases the visual impacts of the project.

Additional project facilities such as the gen-tie line, BESS, and project substation would also cause aesthetic impacts. There are different security requirements for substations, and the use of chain link fence with barbed wire, in addition to the larger steel containers, transformers, and concentration of equipment means there would be larger anticipated aesthetic impacts. This part of the project is on a rural road with some residences on lots that range from two to four acres. The nearest non-participating residence to the O&M building, BESS, and project substation would be approximately 1,200 feet west, across an open agricultural field. The applicant would reduce aesthetic impacts to this residence if screening vegetation, potentially including shrubs or small trees, since shading of solar panels is not an issue in this location. A residence located to the east of the BESS and project substation may not experience aesthetic impacts of these facilities due to topography in the area.

3.20.2. Facility Lighting

The project would primarily be constructed during daylight hours. The applicant states there is not an anticipated need for permanent lighting to be used on-site during construction. Temporary lighting may be used in some areas of construction, made up of light plants connected to trailers with generators to create portable lighted spaces. The applicant states there would be a goal of focusing lights onto construction areas and avoid shining into adjacent properties. Security lighting would also be used in some areas of the project, including the general construction laydown yard. This security lighting is typically made up of down-shielded lighting mounted on poles. Vehicle lights may also be noticeable as trucks and machinery arrive early and leave late at the construction sites. Although there would be an effort to limit light pollution, residences close to the project area, particularly the laydown yard, would likely notice some difference in light pollution during evening and nighttime hours. Most of this would not be anticipated to continue once construction work is complete.

Chapter 12 of the Columbia County Zoning Ordinance Subchapter on Planning and Zoning has a section on exterior lighting standards³⁸. The requirements of that subsection are intended to limit light pollution onto nearby properties, but the subsection does not apply in land zoned for agricultural use. There is a requirement for access locations during construction within a county highway right of way to be marked with hazard marking and lighting in conformance with Uniform Traffic Control Manual standards, managed through the highway access permit.

³⁸ Sec. 12. 140.07.

3.20.3. Glint and Glare

Solar PV panels are constructed of dark, light-absorbing materials and covered with an anti-reflective coating designed to maximize absorption and minimize reflection. However, the glass surfaces of solar panels and the metal supports do reflect sunlight to varying degrees throughout the day and year. The amount of reflected sunlight is based on the incidence angle of the sun relative to the light-sensitive receptor (e.g., a pilot, resident, or road user). The amount of reflection increases with lower incidence angles. The potential effects of this light reflection are glint (a momentary flash of bright light) and glare (a continuous source of bright light). These two effects often referred to together as “glare,” can cause a brief loss of vision, also known as flash blindness³⁹. The intensity of any light reflected from the solar panel would decrease with increasing distance, and landscape features such as vegetation could prevent glint or glare affecting a viewer. Topography can affect glint or glare, for example, a residence or road above a solar facility may experience more glare than when they are at the same level.

The applicant had Pure Power Engineering, Inc. conduct a glare hazard analysis for the project, which is included as Appendix V⁴⁰ of the application. The analysis was done by using the ForgeSolar PV Planning & Glare Analysis Program (GlareGauge) to model how glare might be experienced by residents or road users in the project area. The analysis evaluated potential glare impact at 76 non-participating residences at 5 and 15 feet above ground level to represent viewers on the first and second floors, for a total of 152 observation points. The analysis also evaluated potential glare impact along local roads, evaluating 42 road segments at five feet to simulate drivers in cars. The analysis did not include screening vegetation or buildings that may block the view of the project. The analysis considered the panels at heights of six-feet and nine-feet, with 0-degree and 5-degree resting angles.

The model classifies the impact of glare for an observer into three color-coded levels: low potential for producing an after-image (green), potential for producing an after-image (yellow), and potential for permanent eye damage (red). The results of the analysis are described in greater detail in Appendix V, and the summary is that none of the variables (panel height, resting angle, or viewer location) showed an anticipated glare level in the ‘red’ category, but did show that at an array height of six feet and module resting angle of 0 degrees, green-level glare was predicted at 152 residential observation points and 24 road segments, and yellow-level glare was predicted at 128 residential observation points and 28 road segments. Levels of predicted glare were reduced if a 5-degree resting angle was assumed, down to green-level glare at 41 residential observation points and 14 road segments, and yellow-level glare at 56 residential observation points and 10 road segments.

The applicant states that it does not consider glare in the ‘yellow-level’ as a safety issue. The applicant points out that the model is likely to be conservative and over-estimate amounts of glare predicted as it does not account for physical obstructions between the arrays and the observer points at residences. There may be viewers that find some amounts of glare distracting or annoying. The applicant states that in the event of a complaint about glare caused by project facilities, modeling software would be used to evaluate the time and extent of glare, and that

³⁹ FAA. 2018. Technical Guidance for Evaluating Selected Solar Technologies on Airports. Ver. 1.1.

⁴⁰ PSC REF#: 442079.

information used to determine potential mitigation options. If glare is experienced at residences or specific areas of roads, mitigation options may include fencing or screening vegetation, or adjusting the resting angle of the tracking system.

3.21. Water Resources

3.21.1. Waterways

Waterway Identification and Quality

Waterways were identified using the 24K hydro layer of the DNR Surface Water Data Viewer and during field investigations conducted by the applicant. Ten DNR mapped waterways and one additional field identified waterway flow through the project area. Of those eleven waterways, DNR determined seven to be non-jurisdictional through a navigability determination review. While within the overall project area, none of the jurisdictional waterways flow through fenced array areas. One of the jurisdictional waterways, Rowan Creek, is designated as an Exceptional Resource Water. Rowan Creek has been avoided by project infrastructure.

The project area straddles the Headwaters to the Yahara River, Lake Wisconsin-Wisconsin River, Duck Creek-Wisconsin River and Headwaters to the Crawfish River Watersheds. There is no FEMA mapped floodplain within the project area.

Potential Waterway Impacts

Construction activities conducted near and across waterways have the potential to impact water quality and aquatic species habitat. Forested and shrub areas along waterways provide a natural corridor for wildlife movement, help maintain soil moisture levels in waterway banks, provide bank stabilization, filter nutrient-laden sediments and other runoff, maintain cooler water temperatures, and encourage a diversity of vegetation and wildlife habitats. The removal of riparian vegetation can cause water temperatures to rise and negatively affect aquatic habitats, especially cold-water systems. Removing riparian vegetation may decrease shoreline protection and may lead to increased sedimentation of waterways. Vegetation disturbance along the waterway can also lead to the infestation by invasive and nuisance species.

The use of heavy equipment on waterway banks may also cause soil compaction. Constructing in areas with seeps and springs may temporarily alter the surface and subsurface hydrology feeding waterways. Recreational use such as sight-seeing, boating, fishing, or bird watching could be adversely affected by activities in and adjacent to waterways.

Waterway Impact Avoidance and Minimization

All attempts should first be made to avoid impacting waterways. Impacts to waterways can be avoided by siting the project away from riparian corridors, using alternative collector line installation methods (trenchless), and utilizing alternate access routes such as off-ROW access roads to avoid equipment access across waterways.

The project is designed to avoid all direct regulated impacts to waterways. Project infrastructure installed above-ground such as driveways, array panels, and fence lines would be located a

minimum of 75-feet from waterways. Construction equipment would not cross waterways for project construction.

Indirect waterway impacts should be avoided and minimized as much as possible. Construction and operation of projects near waterways may have both short-term and long-term impacts. The type and significance of the impact is dependent on the characteristics of the waterway and the construction activities proposed. Physical features of the waterway are considered when assessing potential impacts to water quality, water quantity, habitat, recreational use, and the scenic quality of the waterway.

In order to minimize impacts to waterways, the following practices should be followed:

- Utilizing trenchless installation method under waterways, when possible, to avoid disturbance to the bed and banks.
- Preparing and implementing a contingency plan to address the containment and clean-up of inadvertent releases of drilling fluid (frac-outs) in waterways. This should include having the appropriate materials on-site to contain and clean-up any frac-outs that may occur.
- Installing site-specific sediment and erosion control measures prior to construction activities and inspecting and maintaining them daily throughout all construction and restoration phases.
- Establishing a cover crop by pre-seeding areas of exposed soil prior to construction.
- Implementing a construction sequencing plan that minimizes the amount of land disturbed or exposed (susceptible to erosion) at one given time across the project.
- Avoiding disturbance of vegetative buffers to water resource whenever possible
- Revegetating disturbed areas and areas of exposed soil as soon as possible.
- Avoiding the use of herbicides near waterways, or utilizing herbicides approved for use in aquatic environments.
- Preparing and implementing dewatering practices to prevent sedimentation into waterways.
- Marking the location of waterways in the project area.
- Isolating all soil piles from waterways with perimeter erosion control BMPs.
- Limiting the amount of time necessary to complete construction.

The project has been sited to avoid direct impacts to waterways from project infrastructure. Collector circuits would cross two waterways using the horizontal directional drilling (HDD) installation method to avoid impacts to the resource. Construction activities associated with the collector circuits would occur in upland, outside of the waterway banks. Vegetation removal for HDD installation would be minimal and confined to low growing herbaceous vegetation along the field edges.

Site disturbance for project construction would be temporary. Site restoration, including revegetation, should be completed as soon as possible following construction. Sediment and erosion control devices would be installed before ground disturbance occurs to reduce erosion and trap sediment from entering sensitive resources and would be in place until vegetation is reestablished.

The applicant should conduct regular inspections, including areas where construction is occurring adjacent to water resources and other sensitive resources, to ensure that proper BMPs are employed, minimization measures are being followed, permit conditions are met, and site restoration is completed. The applicant stated they would utilize a third-party monitor to ensure compliance with permits, to ensure wetland and waterway impacts are being avoided and that environmental best management practices are being implemented.

Beneficial and indirect impacts to waterways in the project area could result from a decrease in the amount of fertilizer and pesticide runoff as a result of the change from agricultural land use to the solar facility. Reducing the regular disturbance of vegetation and soil could also reduce local soil erosion and sedimentation once the site has established vegetation.

3.21.2. Wetlands

Wetland Identification and Quality

Wetlands within the proposed project study area were identified through wetland delineations completed in 2021 and 2022. Eighteen wetlands totaling 44.4 acres were identified within the overall project study area, of which 16 wetlands were field delineated and two wetlands were desktop delineated in a portion of the project area where infrastructure is not proposed.

The wetlands in the project study area, as defined by their predominant type, consist primarily of Seasonally Flooded Basins. Shallow and deep marsh wetland types are also present. The majority of wetland within the proposed project facilities are considered to have overall low functional value as they are within or in proximity to agricultural fields and have generally no to low vegetative diversity and are dominated by non-native and invasive species.

The proposed array areas include two wetlands located within the perimeter fence. The alternative array areas include one wetland located within the perimeter fence. This wetland would not be impacted by project infrastructure and would be protected by erosion control best management practices, such as silt fence, during construction.

Potential Wetland Impacts

Construction activities conducted near and across wetlands have the potential to impact wetland functional values, such as floristic diversity, wildlife habitat and water quality protection. Disturbance in and adjacent to wetlands can lead to an increase of invasive species and a decrease in native species diversity. Wildlife habitat and corridors could be impacted by the siting of project components in relation to wetland. The natural water quality benefit of wetlands could be diminished if project components, such as driveways and substations, are installed in wetland.

The degree and nature of impacts to wetlands depend on factors such as the type of wetland, quality of the wetland, ground conditions at the time of construction, and the type and duration of construction activities. Short-term wetland impacts can become long-term impacts if the construction phase is not well managed, or if restoration techniques are not properly applied.

Wetland Impact Avoidance and Minimization

The project's impact to wetlands would be avoided and minimized by siting project components outside of wetlands and by utilizing construction practices that avoid wetland impact. The project, if constructed as proposed, would avoid all direct regulated impacts to wetlands. Potential impacts to the functional values of wetlands would be reduced because the project does not propose any project components, such as transmission line structures, solar arrays, fence lines, inverter pads, access roads, laydown yards, or substations in any wetlands.

Secondary wetland impacts should be avoided and minimized as much as possible. Construction methods that can minimize impacts to wetlands include:

- Utilizing HDD installation methods under wetlands to avoid disturbance.
- Preparing and implementing a contingency plan to address the containment and clean-up of inadvertent releases of drilling fluid (frac-outs) in wetlands. This should include having the appropriate materials on-site to contain and clean-up any frac-outs that may occur.
- Establishing a cover crop by pre-seeding areas of exposed soil prior to construction.
- Utilizing existing roadways, constructed permanent access roads, and temporary off-ROW access roads in upland for access when possible.
- Marking the boundary of wetlands to avoid disturbance by equipment.
- Installing and maintaining sediment and erosion control measures to protect wetland from impact during construction until final restoration.
- Implementing a construction sequencing plan that minimizes the amount of land disturbed or exposed (susceptible to erosion) at one given time across the project.
- Preparing and implementing an invasive species management plan that identifies known areas of invasive species populations, addresses site restoration activities, and includes specific protocols to minimize the spread of invasive species. Best management practices should be used, including cleaning construction vehicles and using construction matting. To minimize the introduction of new invasive species populations, equipment and matting should be cleaned before entering this site or moved between sites.
- Preparing and implementing dewatering practices that prevent sedimentation into wetlands.
- Revegetating disturbed areas and areas of exposed soil as soon as possible, and seeding with a cover crop and/or native seed mix to help prevent the establishment of invasive species.
- Scheduling construction to avoid disrupting sensitive species.
- Limiting the amount of time necessary to complete construction.

The applicant should implement the above practices to avoid and minimize secondary impacts to wetlands. The project is utilizing the HDD installation method for collection lines that cross wetland.

Collector circuits would cross three wetlands associated with the alternative array areas using the HDD installation method to avoid impacting the resource. Construction activities associated with the collector circuits would occur in upland agricultural fields, outside of the identified

wetland complexes. Entry points and exit points of the bores would be positioned a minimum of 10-feet from wetland boundaries to avoid potential impacts to wetland during construction.

The applicant stated that fencelines would be sited a minimum of 30-feet from wetland boundaries. Farmed wetlands would be re-vegetated as detailed in the Vegetation Management Strategy. Sediment and erosion control devices would be installed before ground disturbance occurs to reduce erosion and trap sediment from entering sensitive resources and would be in place until vegetation is reestablished.

The applicant should conduct regular inspections, including areas where construction is occurring adjacent to water resources and other sensitive resources, to ensure that proper BMPs are employed, minimization measures are being followed, permit conditions are met, and site restoration is completed. The applicant stated they would utilize a third-party monitor to ensure compliance with permits, to ensure wetland and waterway impacts are being avoided and that environmental best management practices are being implemented.

3.21.3. State Wetland and Waterway Permitting

DNR participates in the joint review process with the Commission, as detailed in Wis. Stat. § 30.025, with respect to wetlands, navigable waterways, and storm water management. Wisconsin Stat. § 30.025 describes DNR process for reviewing and permitting utility projects that require authorization from the Commission and DNR.

DNR is responsible for regulating the discharge of dredge and fill material into wetlands under Wisconsin Statutes, and Wisconsin Administrative Code Chapter 281.36. State compensatory wetland mitigation is not required for this project, per Wis. Stat. §281.36(3n)(d)2. DNR is also responsible for regulating impacts to navigable waterways and waterbodies under Wisconsin Statutes and Wisconsin Administrative Code Chapter 30. The Project, as proposed, would not require Chapter 30 waterway permits or Chapter 281 wetland permits.

The USACE and/or USFWS might also require additional permits and approvals. Some of the federal legal protections and permitting requirements for activities affecting waters include, but are not limited to:

- 33 USC § 403 Section 10 of the Rivers and Harbors Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable waters of the U.S.
- 16 USC §§ 1271-1287 prohibit federal agencies from authorizing a water resources project that would have a direct and adverse effect on the values for which a river protected by the Wild and Scenic Rivers Act was established.

CPCNs granted by the Commission are often contingent upon an applicant's ability to secure all necessary permits from state and federal agencies. Likewise, any permit granted by DNR or USACE could be contingent on the implementation of all mitigation procedures ordered by the Commission in its CPCN authorization.

3.22. Wildlife

Separate from the review of endangered resources impacts, Commission and DNR staff evaluated potential impacts to other wildlife species from the project construction and/or operation. Most solar projects in Wisconsin are proposed for areas of large agricultural fields, with mixed habitat areas including small forests, wetlands, and residential areas around the arrays. Wildlife species in these areas are likely those that are generally more common and are accustomed to agricultural habitats or human disturbance. Examples of these species include deer, squirrel, raccoons, small rodents, common perching birds, red-tail hawks, pheasant, turkey, and geese.

The ecological impacts of solar arrays are being discussed and examined by other states and organizations. The Nature Conservancy⁴¹ developed Principles of Low Impact Siting and Design for solar PV energy facilities in North Carolina. These principles would also be of benefit when considering solar PV facility siting and construction in Wisconsin. These principles are:

1. Avoid areas of high native biodiversity and high-quality natural communities.
2. Allow for wildlife connectivity, now and in the face of climate change.
3. Preferentially use disturbed or degraded lands.
4. Protect water quality and avoid erosion.
5. Restore native vegetation and grasslands.
6. Provide wildlife habitat.

Several direct impacts to wildlife could occur during construction activities. Wildlife that resides within the construction zone of the project would likely be displaced to adjacent habitats during the construction process. Some species of herptiles may use areas of agricultural fields during their life cycle, primarily for nesting, and could be directly impacted by work activities. If erosion control netting is used, it would be beneficial to use wildlife-friendly varieties, rather than plastic netting, which can entangle small wildlife species.

Fencing Impacts

The use of seven or eight-foot tall agricultural fence around the arrays would restrict the movement of large species such as deer and may cause fragmentation of habitat across the project area. Some smaller animals should be able to pass through the fence and use the solar arrays. The applicant also states that it is willing to use “wildlife permeable” fencing as described in the response to data request ACI 1.19⁴². The term “wildlife permeable” fencing refers to incorporating perimeter fence design choices that allow for small, non-avian and ground nesting avian wildlife species to pass through arrays, and can be done through choice of fence fabric dimensions, height of fence from the ground, or constructed passages where no fence is placed (e.g. eight inch PVC pipe, six inch wood framed openings at areas with high potential for species crossings). If solar developers can utilize these wildlife permeable fencing options and

⁴¹ The Nature Conservancy in North Carolina. 2019. Principles of Low Impact Solar Siting and Design. Accessed at www.nature.org/content/dam/tnc/nature/en/documents/ED_TNCNCPrinciplesofSolarSitingandDesignJan2019.pdf on October 27, 2022.

⁴² PSC REF#: 445668.

provide routes under or through fenced arrays, it would help to lessen the secondary impacts to wildlife species.

By not using barbed wire on the solar array fences, the risk of wildlife injury or mortality due to entanglement decreases. Where arrays are located along road ROWs, the addition of fencing may lead to more wildlife and driver interactions, potentially resulting in injury or mortality. Some landowners in the project area provided comments⁴³ that expressed concern that by fencing arrays near their property, wildlife such as deer could be concentrated onto their agricultural fields, increasing amounts of crop damage. Other commenters more generally expressed concern that fencing arrays would impact wildlife movement and behavior. Identifying fence-free areas in the project area, particularly along environmental corridors such as drainage features or waterways, could provide routes that allow wildlife movement within a project area.

DNR staff inquired of the applicants via email correspondence about the idea of potentially having corner escapes included as a means to allow any deer or large wildlife that would get trapped inside an array fence, a means to escape. The applicants stated that it is Invenergy's experience that if deer were to get trapped in the operating facility, O&M teams would open available gates and work to usher the animal out of the facility. It is also noted that the fencing for High Noon Solar has been designed with big game species in mind, which can be referenced in sections 2.2.8. and 2.3.4.4 of the application as well as Data Request responses to items ACI 1.12 and ACI 1.19. Additionally, the Invenergy ECS team has developed a wildlife friendly fencing document focused on solar that incorporates the latest literature into design where possible. The fencing design at High Noon incorporates the considerations from this document, including no barbed wire on the perimeter fence.

Vegetation Management Impacts

Vegetation clearing, of trees, shrubs, and long grasses, can negatively impact different species depending on when the clearing activities occur. Generally, clearing vegetation outside of nesting or breeding seasons would decrease these direct impacts. It would be beneficial for bats, as well as nesting birds, for any tree clearing to occur outside of the summer avoidance period of June 1 – August 15. As described in Section 3.6 of this EA, the applicant anticipates less than one acre of tree clearing needed for the solar arrays (both Proposed and Alternative) and approximately one acre of tree clearing for collector circuits. The applicant states in Section 5.7 of the application that tree clearing would occur outside the federal avoidance period of June 1 – July 31. As discussed in Section 3.19 of this EA, the mowing of vegetation within project areas would vary depending on the year of operation and location (i.e. under panels, pollinator areas). In response to data request ACI 1.17, the applicant states that mowing in arrays is anticipated to occur in mid-to-late summer, to prevent vegetation from interfering with solar panels. If this summer mowing is planned to occur during migratory bird nesting season, there would be a review for active nests with buffers placed if they are present.

⁴³ PSC REF#: 447753 and 448403.

A comment⁴⁴ from one of the Columbia County Board Supervisors suggested more information on the actual plant species lists and potential limits on the application of "localized herbicide." This comment requested the Commission condition any project approval with a requirement to work with appropriate environmental specialists to identify the best vegetation and pest management practices for strengthening pollinator health. In previous dockets, the Commission has required applicants consult with DNR and Commission staff on final species in seed mixes and could include a review of other actions such as vegetation management protocol (when mowing, herbicide use, or other management actions would occur). Generally, it is anticipated that by changing the ground cover from row crops to a more permanent grassland habitat, a range of wildlife species may find suitable foraging areas and habitat.

4. Cumulative Project Impacts

An EA is required to describe the cumulative impacts of the project combined with other actions and the cumulative effect of repeated actions of the type proposed. The construction of the project is not known to result in the construction of other facilities apart from the interconnection switchyard or result in other impacts such as land conversion. The construction of more solar arrays in the project area could increase the effects of some of the environmental impacts associated with the proposed project. For example, another large solar array built in the area would remove additional lands from agricultural use. Another large solar array would likely use similar fencing around the arrays, further restricting the movement of wildlife through the area and access to habitat. Additional facilities in the area would increase the impact to aesthetics and the local rural character. Commission staff are aware of a second large solar electric generating facility in Columbia County that had an application submitted in October, 2022, in docket 9818-CE-100, which would be approximately 200 MW on approximately 1,200 acres.

The EA describes the potential impact of the proposed project with regards to changes in GHG emissions. The impacts of GHG emissions and associated climate change are inherently a cumulative global impact, and additional projects like the one proposed would result in additional net reductions of GHG emissions and work towards GHG reduction goals.

5. Evaluation of Reasonable Alternatives

Wisconsin Admin. Code § PSC 4.20(2)(e) requires an EA evaluate the reasonable alternatives to the proposed project and significant environmental consequences of the alternatives, including those alternatives that could avoid some or all of the proposed project's adverse environmental effects and the alternative of taking no action.

5.1. No Action Alternative

The No Action Alternative, which could be a denial of High Noon's application, is a potential outcome of the Commission's consideration of this application. Another No Action Alternative would have been the applicant choosing not to make the effort to bring this potential project to

⁴⁴ PSC REF#: 448281.

the Commission in the first place, or that effort falling short prior to filing an application with the Commission. In either instance, the No Action Alternative could result in the continued operation of fossil fueled electric generating units, which may be needed to operate in lieu of the proposed solar photovoltaic electric generation and BESS facilities.

The potential environmental impacts, both positive and negative, of the proposed project described in this EA would not occur under the No Action Alternative. Under the No Action Alternative, the lands would likely remain in agricultural use and the rural character of the area would remain similar to that observed today. Positive environmental impacts resulting from the solar facilities replacing any greenhouse gas emitting generation sources, reducing water usage and withdrawals at existing traditional power plants, and decreased runoff of pollutants, soils, and storm water due to the conversion of agricultural land to stable grassland would not occur if the No Action Alternative is selected.

5.2. Alternative Sites for Project Infrastructure

The applicant proposed a grouping of arrays that could serve as sites for the proposed 300 MW solar project. Wisconsin Stat. § 196.491(3)(d)3 requires the Commission to consider alternative locations when determining whether a proposed generating plant is in the public interest. Wisconsin Admin. Code §§ PSC 111.53(1)(e) and (f), which implement this statutory provision, require a CPCN application to describe the siting process, to identify the factors considered in choosing the alternative sites, and to include specific site-related information for each site. The applicant's siting process was described in Section 1.4 of the application, and summarized in Section 2.3.1 of this EA. If a project alternative was located in an entirely different area of the state from the site selected, specific project impacts would likely change to some extent. Based on the types of projects submitted to the Commission, an alternative project area for these solar electric generation sites would likely use similar types of agricultural lands. Such an alternative site could have impacts specific to the resources in the area, as well as impacts that would be similar to those expected for the proposed project. Without a specific location in the state offered as an alternative site, a specific quantification of the difference of impacts is not feasible.

Based on previous Commission process with large wind energy systems and other large solar generation facilities, this alternative site requirement has been interpreted as requiring the applicant provide at least 25 percent additional siting areas with the proposed project as an alternative. These alternative arrays provide options the Commission could select as allowable areas for the installation of the solar electric generation facility. The Commission will account for a wide variety of factors as it reaches its decision about what sites in the project area, both proposed and alternative arrays, could be utilized for the installation of the solar arrays. In some project reviews, Commission or DNR staff have identified specific parts of arrays, or entire arrays, where environmental impacts would be greater than if other areas were used. Generally, there are no arrays that would remove or convert higher value natural habitats or contain historic or other sensitive resources, such that removal of those arrays from consideration would substantially reduce the impacts of the project.

For the High Noon Project, Commission staff note that there are some areas of Alternative Arrays that are closer to residences where members of the public have stated concerns about

proximity or panels on multiple sides of a property, specifically Alternative Array A5 (arrays on three sides of property). High Noon in final design could avoid using some of these alternative arrays, or provide larger than stated setbacks, and impacts to non-participating residences could be reduced. High Noon states it would continue discussion with non-participating residences on reducing impacts, including vegetative screening or adjusting arrays.

5.3. Other Alternative Actions

An alternative to the proposed solar generation project and BESS could take the form of other energy generation technologies, such as wind energy systems, nuclear energy, or fossil fueled electric generation facilities. Merchant generation plants do not provide the economic or engineering modeling that public utilities are required to, which limits some consideration of alternative actions. Any alternative generation facility would have its own suite of impacts on the human environment, some of which would be similar to those discussed in this EA. For example, wind energy facilities may impact fewer acres directly, but are more visible, at greater distances, than solar projects. The concerns raised over noise and wildlife impacts with regards to wind energy systems are more documented and replacing the solar project with a similar sized (MW) wind energy facility has the potential to have greater impacts to wildlife. If replaced by a fossil fueled generation facility, air quality impacts would be greater than the solar and BESS project. Depending on the location and type of a fossil fuel generation facility, increased impacts resulting from noise, lighting, and water use may occur. All forms of combustible fuels, both fossil fuels and biomass, create some amount of air pollution, which would be subject to air permitting requirements.

6. Wisconsin Environmental Policy Act Determination

When determining whether an EIS is warranted for a given Commission action, the Commission must consider ten broad factors listed in Wisconsin Admin. Code § PSC 4.20(2)(d). Based on the analysis provided in Section 3 of this EA, the following subsections provide Commission staff's conclusions regarding each of the ten factors with respect to the proposed project.

6.1. Effects on Geographically Important or Scarce Resources

The Commission must consider a proposed action's "[e]ffects on geographically important or scarce resources, such as historic or cultural resources, scenic or recreational resources, prime farmland, threatened or endangered species and ecologically important areas." Wis. Admin. Code § PSC 4.20(2)(d)1.

No geographically important or scarce resources were identified within the area to be affected by construction of the proposed project. If proposed mitigation actions are followed, the proposed project is not expected to significantly affect historic resources, scenic or recreational resources, threatened or endangered species, or ecologically important areas. There would be agricultural land taken out of production, including areas classified as prime farmland, for the duration of the

project's operation. When the project is eventually decommissioned, these agricultural areas may again be available for production.

6.2. Conflicts with Federal, State, or Local Plans or Policies

The Commission must consider a proposed action's "[c]onflicts with federal, state or local plans or policies." Wis. Admin. Code § PSC 4.20(2)(d)2.

The large-scale, industrial-like, solar and BESS facilities proposed do not seem to be in keeping with the agricultural designation of the project area in local land use plans. The solar project is intended to be a long-term non-agricultural land use. Applicable land use plans currently allow for solar energy production as a permitted or conditional use of land designated as agricultural preservation. The proposed project would not interfere with farming on adjacent lands. When the project is decommissioned, the project lands could be returned to agricultural use.

6.3. Significant Controversy Associated with the Proposed Project

The Commission must consider any "[s]ignificant controversy associated with the proposed action." Wis. Admin. Code § PSC 4.20(2)(d)3.

Notice of the proposed project was sent to local municipal offices and local media, as well as potentially impacted landowners. There are some landowners in the project area that have questions or concerns about the project, but not more than is considered typical for a project of this size and type.

6.4. Irreversible Environmental Effects

The Commission must consider "[i]rreversible environmental effects." Wis. Admin. Code § PSC 4.20(2)(d)4.

Few aspects of the proposed project would be truly irreversible, although reversing project actions would incur significant costs and create additional disturbance and environmental effects. Short-term impacts such as noise, air quality, disturbance to local residents, erosion, and removal of vegetation would occur as a result of construction activities and would be irreversible. Fuels and some construction materials would be irreversibly committed and unavailable for other uses. None of these irreversible effects can be considered significant.

6.5. New Environmental Effects

The Commission must consider "[n]ew environmental effects." Wis. Admin. Code § PSC 4.20(2)(d)5. The installation of the solar generation and BESS facility infrastructure would be new environmental effects in the project area. The physical presence of these facilities on the landscape would create environmental effects, or changes, relating to land use, aesthetics, wildlife impacts, changes to vegetation, and storm water runoff and infiltration.

Although the Commission has approved several large solar projects in the state so far, only a few have been fully constructed and placed in operation at the time of this review, and there are still uncertainties regarding some of the potential impacts that might occur as a result of this project. The installation of smaller solar PV facilities has occurred elsewhere in the state, but impacts created by those projects are unlikely to be accurately extrapolated for utility scale projects in general. The large increase in fenced acreage along roadsides no longer accessible to certain wildlife could have effects on how animals move through the wider project area. No large scale BESS has been constructed and placed in operation to confirm anticipated effects.

6.6. Unavoidable Environmental Effects

The Commission must consider “[u]navoidable environmental effects.” Wis. Admin. Code § PSC 4.20(2)(d)6.

As discussed in this EA, construction of the project would result in a range of environmental effects that could not be avoided by array selection or construction methods. Some effects may be reduced or minimized but would not be entirely eliminated as a result of project activities. Some of the unavoidable environmental effects that would occur during construction include:

- Soil compaction and erosion;
- Storm water ponding and runoff;
- Disturbance to nearby residents due to light, noise, dust, and vibration;
- Air quality impacts as a result of diesel fumes and dust;
- Disturbance of wildlife;
- Increased traffic in the project area, and
- Cutting or alteration of vegetation.

There would be some unavoidable effects caused by the proposed project that would be longer term, likely lasting the entire time the solar facilities are in operation. These long-term unavoidable environmental effects include:

- Removal of agricultural land from production;
- Aesthetic impacts due to the change from a typical rural landscape to a more industrial appearance, and
- Displacement of wildlife that previously was able to access the fenced array sites.

Some beneficial environmental effects of the proposed project would include the ability to generate electricity without generating greenhouse gases. Additional beneficial effects could include a reduction in pesticides and soil runoff by changing from agricultural use to grassland, provided that the applicant maintains ground cover vegetation without the use of chemicals such as pesticides or fertilizers.

6.7. Precedent-Setting Nature of the Proposed Project

The Commission must consider “[t]he precedent-setting nature of the proposed action.” Wis. Admin. Code § PSC 4.20(2)(d)7.

This is one of several recent large utility-scale solar electric generation facilities that include a BESS to be reviewed by the Commission. The proposed solar facilities, gen-tie line, and BESS in this docket do not appear to set any unique precedents in and of themselves.

6.8. Cumulative Effects of the Proposed Project

The Commission must consider “[t]he cumulative effect of the proposed action when combined with other actions and the cumulative effect of repeated actions of the type proposed.” Wis. Admin. Code § PSC 4.20(2)(d)8.

The construction of more solar arrays in the project area, or possibly elsewhere in the state, would exacerbate some of the environmental impacts that may be caused by this proposed project. Another large solar array would remove additional lands from agricultural use, or if no agricultural fields are available, another project may cause increased impacts to more natural areas such as wetlands, forests, or natural grasslands. Another large solar array would likely use similar fencing around the arrays, further restricting the movement of wildlife through the area and access to habitat. Additional facilities in the area would increase the impact to aesthetics and the local rural character. Further solar electric generation facility or BESS construction could displace fossil-fueled generation, benefitting air quality and limiting greenhouse gas emissions.

6.9. Foreclosure of Future Options

The Commission must consider “[t]he foreclosure of future options.” Wis. Admin. Code § PSC 4.20(2)(d)9.

The construction of the proposed project would remove participating fields from agricultural production or other uses during the operational life of the project. Landowners are not typically allowed access to or use of the land during the project lease period. Some solar projects are studying the co-location of some agricultural activities on land used for solar facilities. This type of ‘agri-voltaic’ use has not been proposed for the current project but may be evaluated in the future. Other landowner uses within arrays such as hunting or use for snowmobile trails would not be permitted. After the sites are decommissioned, the lands could be restored and used for agricultural or other purposes.

6.10. Direct and Indirect Environmental Effects

The Commission must consider “[d]irect and indirect environmental effects.” Wis. Admin. Code § PSC 4.20(2)(d)10. As discussed throughout this EA, the construction and operation of the proposed project would cause a range of direct and indirect environmental effects.

Direct effects would include soil disturbance and vegetation removal in any areas not previously cleared as a result of agriculture activities. These activities increase the risk of soil erosion and

runoff, particularly where grading or excavation is done at a large scale. In areas near wetlands and waterways, this soil erosion and runoff can cause sedimentation, which has a negative effect on fish and other aquatic species. Soil erosion and runoff can also negatively affect adjacent properties by depositing sediment, increasing scour of soils, or damaging vegetation. These direct effects can be mitigated through use of storm water and erosion control best management practices. Prompt vegetation establishment on areas of disturbed soils can assist in making these impacts temporary.

The project would increase noise, dust, and vibration in construction areas, causing direct effects for those that experience impacts from these activities. There would be increased traffic in the project area as employees and deliveries travel to and from project areas. A visual change in project areas would affect viewers differently and may have negative, positive, or no effect on the viewer. Vegetation screenings can mitigate any of these effects to some amount, as could larger set back distances. Areas through which wildlife currently freely pass would be fenced, restricting movement and use by certain species. Direct displacement of species could occur during construction activities. Indirect effects of the proposed project could include increased pressure on or use of adjacent, non-fenced areas. There could be negative effects, including mortality or injury, on birds due to the gen-tie line and, potentially, the solar arrays.

Direct effects of tree clearing or vegetation removal include altering habitats and potential introduction of forest pests and invasive species. Indirect effects from invasive species introduction include the spread of these species onto adjacent areas, and the effort and cost to control these species if established. Although tree clearing is relatively limited for this project, the applicant should ensure that all staff and contractors follow BMPs such as those provided by the DNR and WI Council on Forestry to mitigate negative effects.

Construction in and through agricultural fields would result in both temporary and long-term impacts. Some areas, such as laydown yards and temporary access roads may only be taken out of agricultural use during the construction phase of the project. The solar arrays, BESS, new project substation, and O&M building would be taken out of agricultural production for the operational life of the project. Soil compaction and topsoil loss in agricultural fields are direct impacts that can affect future productivity. If drainage tiles are broken or damaged, the drainage of the arrays and surrounding fields could be affected, although some impacts might not be immediately known. The use of construction BMPs and post-construction soil restoration can reduce many direct impacts to agricultural operations. The eventual impacts of decommissioning the solar facilities are not well known, but it is likely that thorough decommissioning, including de-compacting soils and repairing any damaged drainage tiles, would allow properties to resume agricultural use.

The local environment could benefit from the use of a diverse native seed mix, particularly one that contains a range of flowering plants known to benefit pollinator species. The level of that effect would depend on the amount of, and location of, any land planted with a more 'pollinator-friendly' seed mix. The anticipated reduction in herbicides and pesticides placed on the project lands would be a benefit to biodiversity and local soil and water quality.

Air quality would experience minor and temporary negative effects due to the operation of construction machinery and potentially dust from disturbed soils. Once construction is complete, these impacts would cease, and during the operational phase, any displacement of fossil-fueled power generation by the project would improve air quality.

The property lease payments to participating landowners and shared revenue dollars to the hosting towns and Columbia County could have direct and indirect net positive impacts on the long-term local economies. Local fire departments and first responders would need additional training on how to respond to incidents in the solar arrays or at the BESS, which should be informed by the applicant's emergency response plan.

7. Recommendation

This EA informs the Commissioners, the affected public, and other interested people about the proposed project and its potential environmental and social impacts. Through data requests, additional analyses, and a review of public comments, Commission staff has provided very thorough, factual and up-to-date information about the project, potential impacts of the proposed project, and the mitigation measures that could address some of those potential impacts.

The EA concludes that construction and operation of the project would be likely to have a range of environmental effects. Commission staff has not identified any potential environmental effects of the proposed project that could be considered significant. This evaluation is arrived at assuming that some, if not all, of the mitigation measures proposed by the applicant and Commission or DNR staff are used.

This assessment finds that approval and construction of this project is unlikely to have a significant impact on the human environment as defined by Wis. Stat. § 1.11, therefore the preparation of an EIS is not required.

 X Environmental review complete. Preparation of an environmental impact statement is not necessary.

 Prepare an environmental impact statement.

Submitted by: Stacy Schumacher
Environmental Analysis and Review Specialists
Date: 11/14/2022

This environmental assessment complies with Wis. Stat. § 1.11, and Wis. Admin. Code § PSC 4.20.

A handwritten signature in black ink, appearing to read "Adam Ingwell". The signature is fluid and cursive, with the first name "Adam" and last name "Ingwell" clearly distinguishable.

Adam Ingwell
Environmental Affairs (WEPA) Coordinator – Supervisor
Date: January 5, 2023